

DWELLING ENVIRONMENTS IN TAICHUNG, TAIWAN  
An Analysis for the Development of Urban Settlements

BY

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Submitted to the Department of Architecture  
on May 11, 1979 in partial fulfillment of the requirements  
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## ABSTRACT

This study/analysis presents a comparison of low-income settlements in different locations in Taichung Area, Taiwan. It provides data and recommendations to formulate, evaluate and implement the development of urban settlements especially in residential land utilizations.

Thesis Supervisor: .....

Horacio Caminos

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Title:



## CONTENTS

CONTENTS.....	5
ACKNOWLEDGEMENTS.....	6
INTRODUCTION.....	7
National Context.....	8
Regional Context.....	10
Urban Context.....	11
CASE STUDIES.....	14
Chien Kou/Liu Chuan.....	15
Chien Kou Market Housing.....	18
Liu Chuan Canal-bank Settlements.....	22
Hwei Lai/Situn.....	26
Hwei Lai Military Housing.....	32
Situn Private Developments.....	34
Lu Liao Semi-rural Settlements.....	36
EVALUATION / ANALYSIS.....	42
Land Utilization: Patterns, Percentages, Network Efficiencies, Density.....	43
Physical Data Matrix.....	44
Land Utilization: Analysis.....	46
GLOSSARY.....	48
BIBLIOGRAPHY.....	52
EXPLANATORY NOTES.....	52

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Finally, I am very grateful to my parents for their encouragement and support all through these years and to my wife, Su Ching, for her care and assistance on the final typing.

## INTRODUCTION

### CONTENTS

This research describes and analyzes dwelling environments of the lower income group in Taichung area. The following is included: A summarized national context and its regional indexes; a brief introduction of the Taichung Region developments; a description of the urban context; five case studies which deal with the lower income settlements in different stages and a comparative evaluation and analysis in pattern, land utilization, urban matrix and a recommendation of residential land developments. In each case studied, the materials include: a brief context; locality plan, land use pattern, circulation pattern, segment plan, block land utilization; typical dwelling; physical data related to dwelling and land; and socio-economic data related to users.

### OBJECTIVES

The detailed studies indicate the problems existing in the physical environment of lower income settlements which is the focus of current public housing policy.

Some existing urban layouts are not entirely carried out as it was planned. Uncontrollable developments which ignore the commands of rational planning lead to a random circulation pattern or a unsystematic infrastructure network results in difficult technical problems and higher costs.

It is fact that every dwelling is expanding disregarding the Building Codes in order to lodge more people in the inadequate space or to obtain better living conditions in an enlarged unit. In the case of small lots for lower income groups, the workable alternative is to expand the dwelling space on the group without requiring a multi-story structure.

The maximum lot coverage requirements cannot be enforced.

The ambiguity of control and who is responsible in some "no-man's area" which include small alley, fire lane, and undefined open space, creates the deterioration of the surrounding environment.

Confronting these problems, the study attempts to propose an alternate recommendation to the housing developments of the lower income group. The analysis and evaluation of existing situations intend s to identify the physical structure of urban living environments and residential land utilization as well as to illustrate land/dwelling systems in different stages of urbanization. These can serve as a reference guideline to stimulate the on-going project "The Development of Taichung Harbor Special District".

### APPLICATION

The analysis provides a sequential framework of low income settlements and urban environments ranging from existing government housings and private developments. The materials are arranged so they can be viewed individually or comparably in order to "capture and tackle" the physical reality. The recommendation offers alternate planning guidelines and design norms for the development of urban settlements in the Taichung Harbor Special District.

### DATA

This study is derived from field research carried out by author during the summer of 1977 and 1978, complemented by maps, photographs and various reference studies. The case study analysis is based on the format developed in the Urban Settlement Design Program in order to be comparably perceived with hundreds of different cases in other developing countries around the world which are available at the Massachusetts Institute of Technology.

## NATIONAL CONTEXT

### TAIWAN REPUBLIC OF CHINA

**PRIMARY INFORMATION:** Taiwan, which is also known as Formosa, is an island situated off the southeastern coast of the mainland China, latitude 21°45'-25°37' north, longitude 119°18'-122°6' east. The north-south central mountain range divides the island into a rocky, rugged strip of land of the east and the fertile plains of the west. Because of the mountainous terrain, less than one-third of the island can be considered arable. High forested mountains cover most of the land. The climate is sub-tropical in the north and tropical in the south with an average temperature 75°F. Hot, humid summer lasts from May to October and winter is chilly. Occasional earthquakes cause little damage, but Typhoon (tropical hurricane) which usually comes with heavy rainfall brings serious floods on agricultural and even urban land in the late summer.

**HISTORY:** The aborigines of Taiwan are believed to be of Polynesian Stock. The Chinese crossed the Taiwan Strait from the Provinces of Fukien and Kwangtung as early as the 12th Century. From 1624 to 1646, Taiwan was under Spanish and Dutch domination, population was 30,000. In 1661, the Dutch were ousted by a patriot of Ming Dynasty, General Cheng Chen-Kung (Koxinga),

who held out from Chinese mainland after the Manchus and made a prefecture of Fukien in 1684. Large-scale immigration began and by 1810, the population had reached 2,000,000. The Manchu government made Taiwan a province in 1885. In 1895, Taiwan was ceded to Japan at the conclusion of the first Sino-Japanese War. In 1945, after World War II, Taiwan returned to China as a result of the Cairo Agreement. But since 1949, Taiwan has become the effective territory of the Republic of China. Taipei is the temporary Capital.

**GOVERNMENT:** The Taiwan Provincial Government as well as Taipei Special Municipality are under the jurisdiction of the Executive Yuan of the Central Government which is the highest administration body of the Republic of China. Local governments consist of 16 prefectures and 4 major provincial cities, which includes: Kaohsiung, Taichung, Tainan, and Keelung.

**ECONOMY:** In 1976, per capita income stood at US\$849, (World Bank estimate: US\$1,070) the gross domestic product was US\$14,732 billion and the growth rate recorded a 11.76%. In average, the economic growth between 1953 and 1976, was about 7% per annum. Official foreign exchange rate in

the end of 1978 was one U.S. dollar to 36.05 New Taiwan dollars, now the rate is floating.

**DEMOGRAPHY:** At the end of 1976, total population was 16,508,190. The gross density was 458.79 persons per square kilometer., among the highest in the world. About 98% of the population is made of Han origin from mainland China and less than 2% are aborigines.

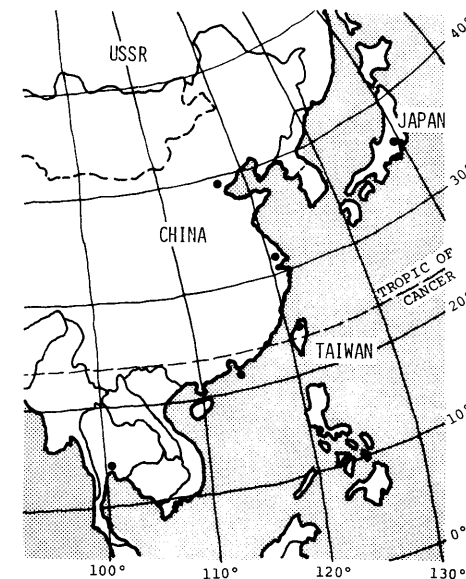
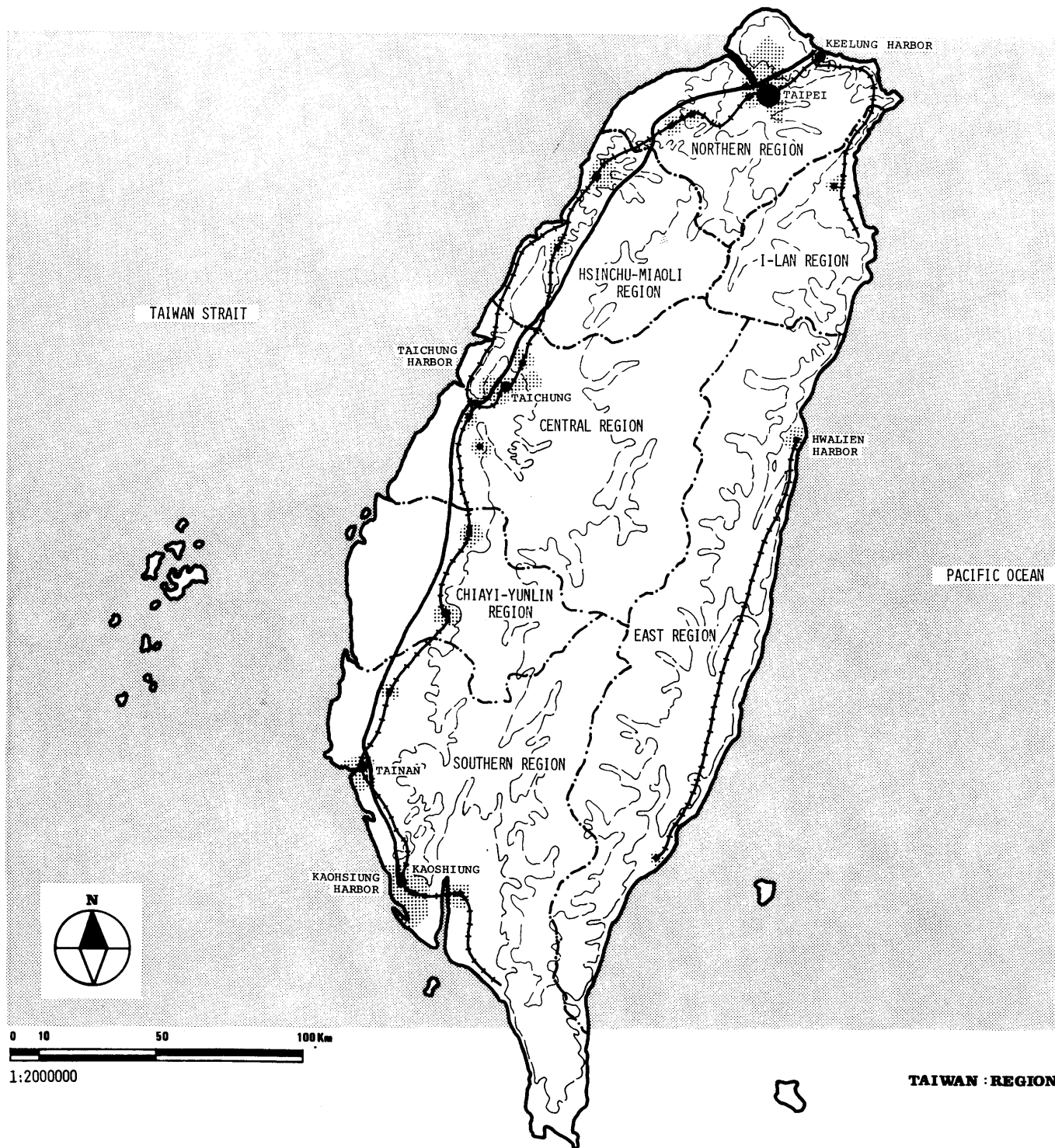
**SOCIO-CULTURAL:** There were 3,916,600 households at the end of 1976 with an average family size of 5.28% persons. Adult literacy rate was 93% in 1976. Life expectancies of male is 67.1 yrs. and female is 72.5 yrs. Though the official national language in Mandarin, local dialects as Taiwanese, Fukienese and Hakka are also being used.

**SOCIO-ECONOMIC:** The lowest income sectors are concentrated in rural areas. The rate of urbanization is very high. 5.9% of the total area is urbanized and inhabited by 59.7% of the total population in 1976. Regional and urban development data are listed in the chart below.

#### REGIONAL DEVELOPMENT DATA

REGION	CENTER	POPULATION (person)	AREA ( km <sup>2</sup> )	PERCENTAGE OF URBANIZED AREA ( % )	PERCENTAGE OF URBAN POPULATION ( % )	TOTAL POPULATION INCREASE RATE ( % )	PER CAPITA INCOME (US\$)	HOUSING DEMAND (No. of units)	AVERAGE FLOOR AREA PER CAPITA (m <sup>2</sup> /person)
Northern R.	Taipei	5,085,496	3,678	23.0	85.3	+3.73	1140	1,604,000	14.16
Ilan R.	Ilan	431,291	2,138	2.2	47.0	+0.76	747	69,600	12.58
Hsinchu-Miaoли R.	Hsinchu	1,165,432	3,352	2.7	52.2	+0.52	668	226,900	12.83
Central R.	Taichung	3,084,161	7,388	5.5	45.7	+1.66	522	671,300	12.00
Chiayi-Yunlin R.	Chiayi	1,644,251	3,242	5.0	31.9	-0.01	856	329,200	9.68
Southern R.	Kaohsiung	4,458,184	8,040	6.0	59.0	+1.68	628	910,200	11.49
Eastern R.	Hualien	639,375	8,144	1.1	44.6	+0.40	571	105,400	11.22
TAIWAN		16,508,190	35,982km <sup>2</sup>	5.9%	59.7%	+1.96%	US\$ 849	3,916,600	12.32m <sup>2</sup>





**NATIONAL CONTEXT SOURCES**

- Development Regions* : (Accurate) Comprehensive Development Regions for Taiwan Area, 1972
- Regional Development Data* : (Accurate) Urban and Regional Development Statistics, 1976
- (Accurate) Urban Planning Department, E.P.C. 1977
- (Accurate) Urban Growth and the Planning of Urban Developments in Taiwan (Accurate) Housing and Urban Development Dept. 1977

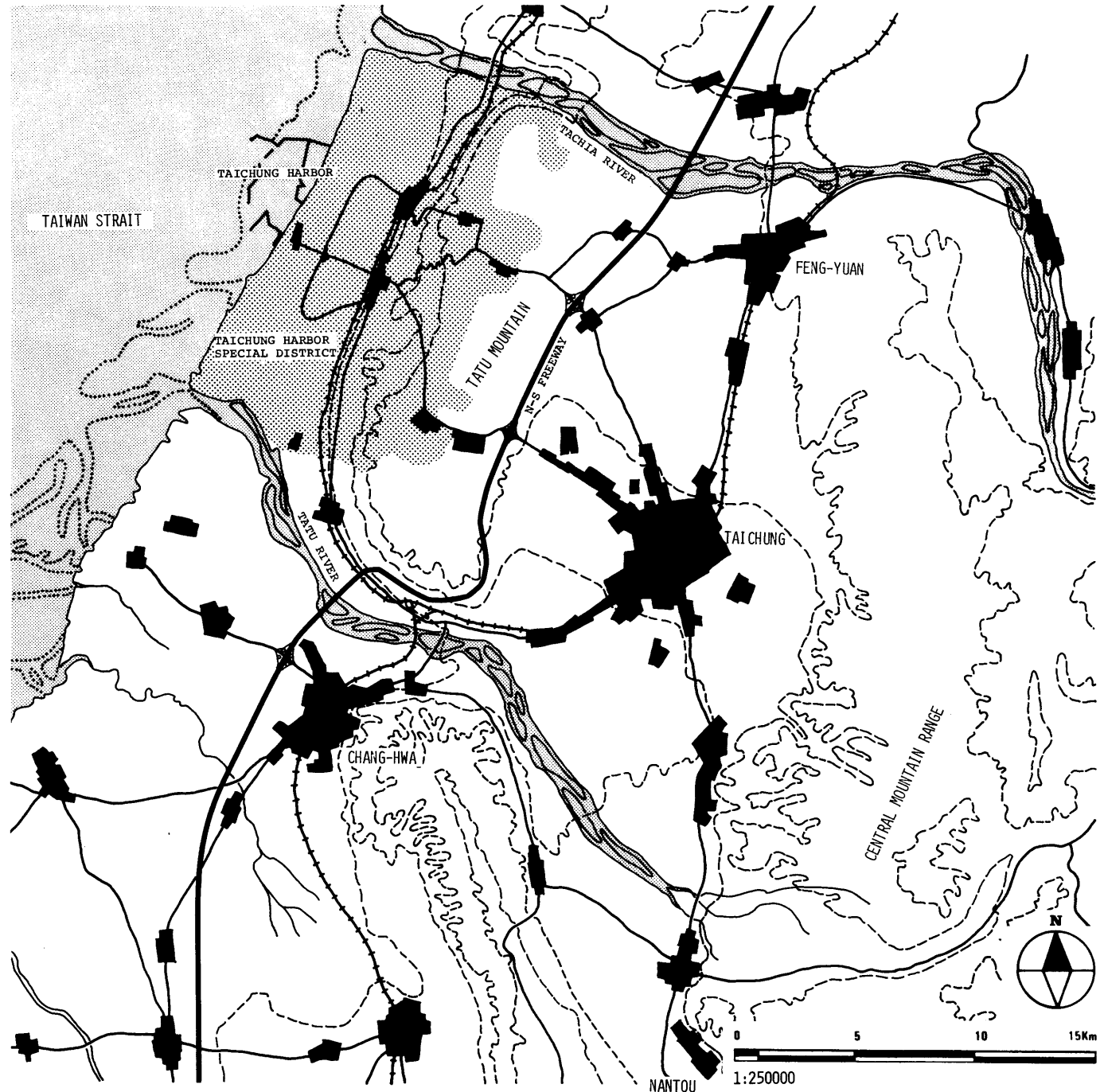
## REGIONAL CONTEXT : TAICHUNG HARBOR SPECIAL DISTRICT

Central Region, which includes Taichung Municipality and Taichung, Chang Hwa, Nan Tou prefectures, is essentially developed in agriculture basis. Compared with the Northern and Southern Region in terms of their growth rate, it shows an unbalanced urbanization in Taiwan. In order to stimulate its development, a new international port, Taichung Harbor, with adjacent industrial zones which is one of the big ten national economic development projects carried out in Taiwan is under construction since 1972 and is scheduled to be finished within 20 years.

The Taichung Harbor Special District (THSD) is an affiliated urban development which is expected to have a severe change in land use, population, facilities and transportation. In 1972, the provincial government developed a preliminary sketch plan for the THSD. The area is defined by the Tachia River on the north, Tatu River on the south, Tatu Mountain on the east and Taiwan Strait on the west with a total area of 17,092.55 hectares. The planning area encloses three existing small towns; Ching Shui, Sha Lu, Wu Chi and the rest, including Lung Ching, are agricultural lands separated by small rural settlements. According to the official report, the target population is 500,000 persons (160,000 persons existing) and 12,636 hectares is set aside for a city which will integrate those existing towns in 20 years. In conjunction with the construction of the new harbor, the urban development is divided into five stages and the first stage is planned to be finished in 1980.

### REGIONAL CONTEXT SOURCES

Map : (Accurate) Taichung Regional Plan, 1970  
 General : (Accurate) IBID  
 (Accurate) Taichung Harbor Special District Plan, 1972  
 (Accurate) Urban and Regional Development Statistics, 1976  
 (Approximate) Field Survey, Author 1978



# URBAN CONTEXT TAICHUNG

Population: 561,071 persons  
 Urban population: 442,819 persons  
 Area: 16,340 Ha.  
 Urbanized area: 4,190 Ha.  
 Population growth rate: 3.33 %  
 Annual income: US\$ 672 per capita  
 US\$3199 per household  
 Average family size: 4.76  
 Floor area per capita: 14.80 m<sup>2</sup>  
 Literacy rate (over 6): 91.2 %  
 Dependency ratio: 60.9 %

## Taichung (T'ai-Ch'ung)

Taichung, located in an alluvial basin midway along Taiwan's western coastal plains, is the island's third largest city. It is the complex product of a distinctive history-born as a small Chinese farming village; nurtured in infancy by Ch'ing Dynasty official; pushed into adolescence by a centralized Japanese colonial regime; and matured under Republican China. A combination of new and old cultural, economic, and administrative forces and institutions shape its form and influence its contemporary functions. Now, it has been a major regional centre in the activation of the central government's strategy for economic development of the island which includes the construction of Taichung Harbor and the urban development of its adjacent area; " Taichung Harbor Special District".

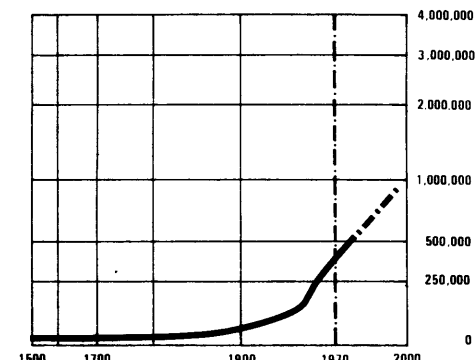
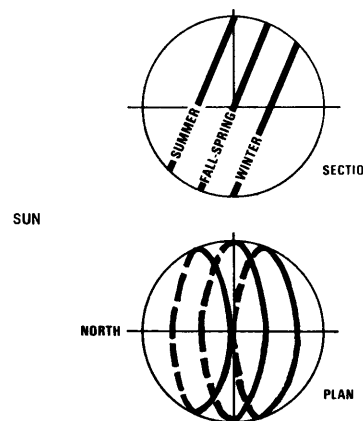
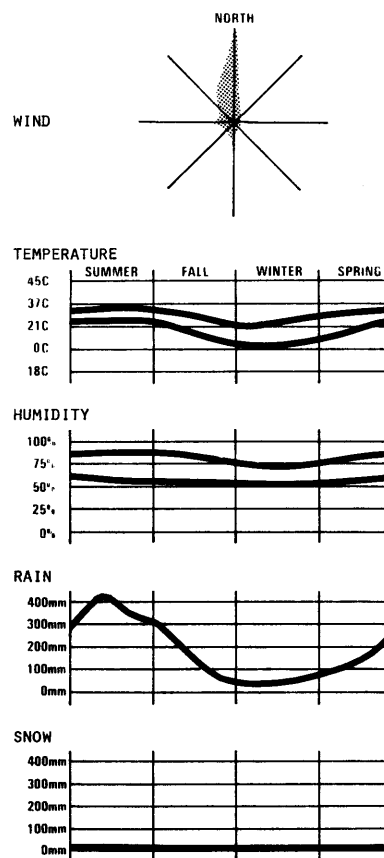
## GOVERNMENT

On the hierarchy of administration, Taichung Municipality is coequal with Taichung Prefecture, directly under the jurisdiction of Taiwan Provincial Government. The administration unit consists of eight districts; central, and north, east, south, west around the CBD, and Peitun, Situn, Nantun in the suburb.

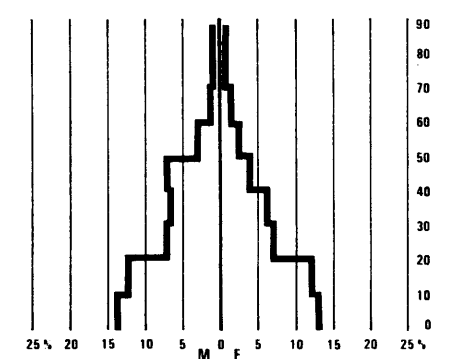
## URBAN CONTEXT SOURCES

**General** : (Accurate) Taichung Master Plan June 1971  
 : (Accurate) Taichung, Taiwan; Structure and Function 1973  
**Climate** : (Accurate) Taichung Master Plan June 1971  
**Topography and Circulation** : (Accurate) IBID  
**Land Use Pattern** : (Accurate) IBID  
**Income Pattern** : (Approximate) The Statistical Abstract of Taichung Municipality 1976  
**Urban Growth Pattern** : (Accurate) Taichung Master Plan June 1971

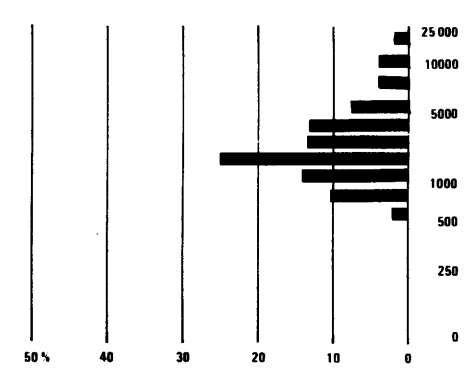
TAICHUNG 24.2N



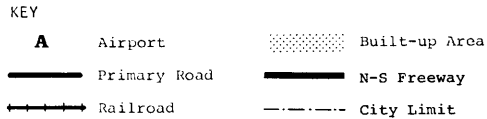
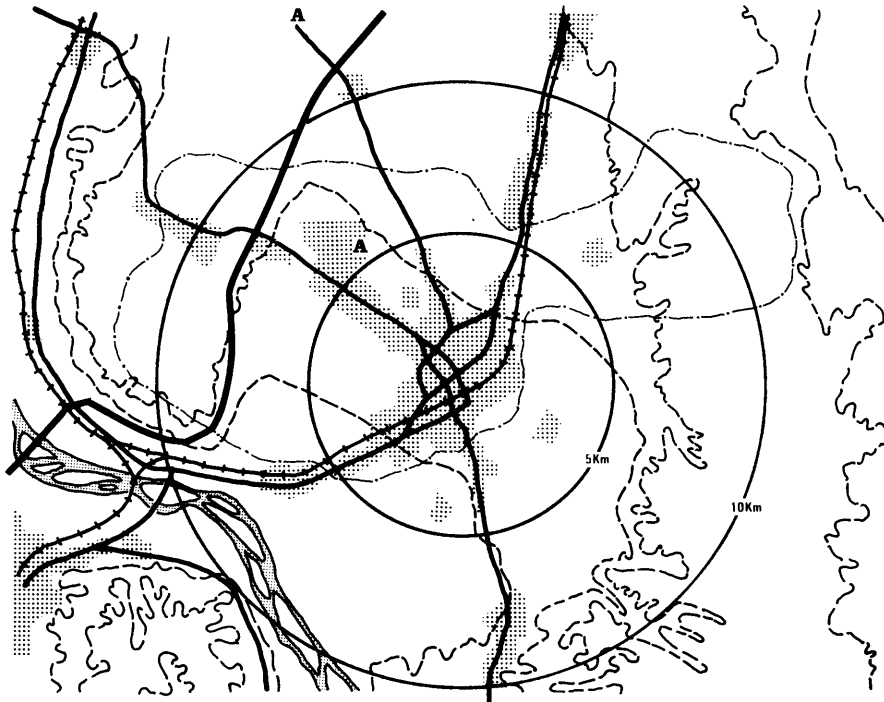
URBAN POPULATION GROWTH  
 horizontal: dates vertical: population  
 Source: Taichung Master Plan, 1971



URBAN POPULATION DISTRIBUTION  
 horizontal: percentages vertical: ages  
 males: M females: F  
 Source: Abstract of Taichung Municipality, 1976



URBAN ANNUAL INCOME DISTRIBUTION  
 horizontal: percentages vertical: dollars  
 Source: Abstract of Taichung Municipality, 1976



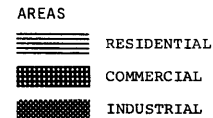
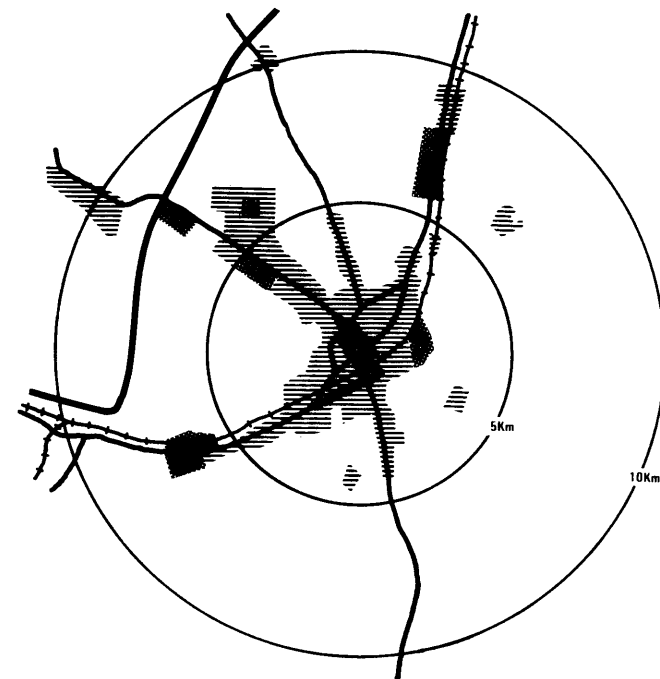
**URBAN TOPOGRAPHY AND CIRCULATION**

The Taichung Basin, in which Taichung City is located, lies between two of Taiwan's major rivers--the Tachia River and the Tatu River. It is 48 kilometers long (north to south) and about 14 kilometers wide (east-to-west) and encompasses more than 600 square kilometers. Taichung City, as an administrative entity, today stretches 21 kilometers from east to west across the basin and about 12 kilometers from north to south at its widest point. Ground-shaped, the city lies roughly along an east-west axis and stretches from the western periphery of the Central Mountain divide atop Tatu Mountain. Tatu Mountain

is a smooth, gently-rising ridge on the city's western flank. The city's highest elevation is 859 meters above sea level on its mountainous eastern border, and the low point in the basin is 37 meters above sea level at a point in South Bivouac District (Nantun District).

**URBAN LAND USE PATTERN**

Within the Municipal limit, only 25% is urbanized, 53% is agricultural and the rest is unusable. The major commercial district is centralized in the old area around the railroad station and linear commercial

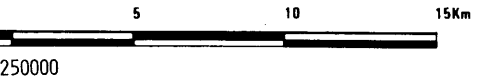


**URBAN LAND USE PATTERN**

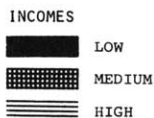
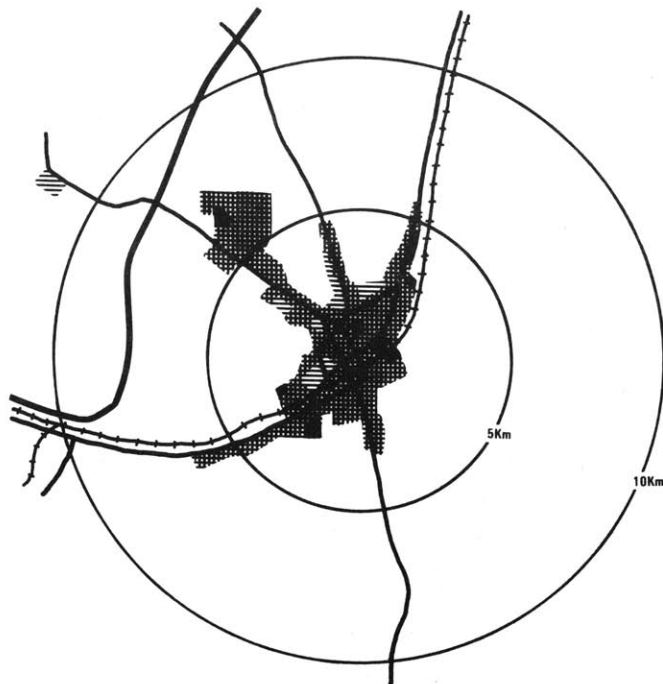
strips which stretch along the major roads out to the suburban area. Situn, the largest sub-center, encloses approximately one-sixth of the total population. It is located on the Taichung Harbor Road about 6 kilometers west from the center. The current development trend is to integrate the Situn District. The zoning ordinance in Taiwan allow certain minor commercial uses in the residential area which is about 8% of the urbanized land.

**URBAN INCOME PATTERN:**

In 1976, the average income per household



in Taichung City was estimated to US\$ 3,199 per year and 80% of the total population concentrated in the urban area. Upper income people located around the city periphery of the highly centralized urban area in detached or semi-detached houses which were built during the late Japanese-Dominated Period and the Post-War Period 15 years later; higher ownership of automobiles and motorcycles as well as prosperous real estate development encouraged many upper income people to move outward to the suburb or even to the exurban region. The low and very low income group is located in the old squatter settlement



**URBAN INCOME PATTERN**

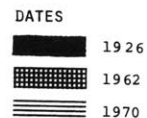
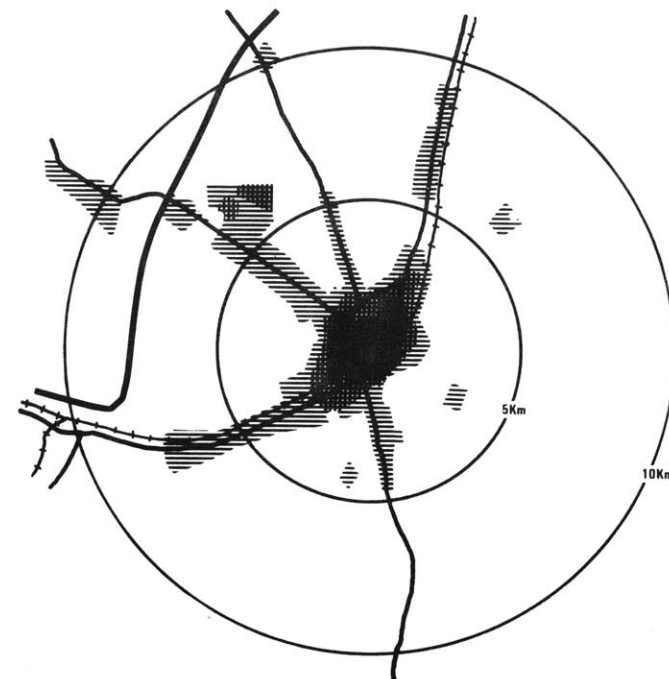
near the city center and along the two canals: "Lu Chuan, Liu Chuan" which were called the "Aggravated Appendix" in Taichung.

**URBAN GROWTH PATTERN**

The urban growth & history of Taichung City can be divided into 3 stages: Ming/Ching Period, Japanese-dominated Period and Post-war Period.

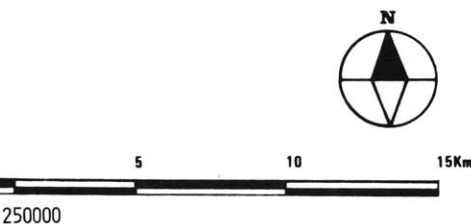
Ming/Ching Period: Archeological evidence indicates the existence in the late 17th century of aboriginal settlements along

the rivers in the southwest section of central Taichung basin. Because of the large-scale immigration from Mainland China, natives moved eastward into the mountain region and the whole area was dominated by the Han-Chinese in 1801. Taichung was once selected as the administrative capital for the island of Taiwan by governor Liu, Min-Chuan when Manchu made Taiwan a province in 1886. Though it lasted for only five prosperous years, the fundamental urban form which included 364 Ha. had been developed. The population was estimated at less than 10,000.



**URBAN GROWTH PATTERN**

Japanese-Dominated Period: Preliminary urban plans which became the basis for the current development was undertaken by the Japanese since 1908. The streets, railroad, infrastructure network, parks have been planned and constructed in an area of 526 Ha. with a target saturated population of 50,000 persons. The official name, Taichung City, was given at that time. During the next 30 years, the urban area sprawled rapidly and the population increased to over 100,000 persons, which necessitated the enlargement of the planning area to 1801 Ha. in 1931. The second obstruction to the urban growth was the



Pacific War which finally ended the Japanese domination.

Post-War Period: Because of the Chinese Civil War, Taiwan became the effective territory of the Republic of China. The provincial government moved back to the central region while Taipei became the temporary capital. Implementation of the National Economic development in Taiwan revitalized Taichung City. In 1976, the total population reached 561,070 persons, and the centralized urban area expanded to 4,189 Ha.

# CASE STUDIES



CASE	LOCATION	DEVELOPER	TYPE OF DEVELOPMENT	DWELLING TYPES
1. CHIEN-KOU MARKET HOUSING	URBAN City center	PUBLIC	INSTANT	APARTMENT 1-2 Fl.: shops 3-4 Fl.: Apt. units
2. LIU-CHUAN CANAL-BANK SETTLEMENTS	URBAN city center	PRIVATE	PROGRESSIVE	GROUP HOUSES brick/wood/shanty
3. HWEI-LAI MILITARY HOUSING	SUB-URBAN near sub-center	PUBLIC	INSTANT	ROW HOUSES one story
4. SI-TUN PRIVATE DEVELOPMENTS	SUB-URBAN near sub-center	PRIVATE	INSTANT	ROW HOUSES 2-4 stories
5. LU-LIAO SEMI-RURAL SETTLEMENTS	EX-URBAN	PRIVATE	PROGRESSIVE	FARM HOUSES one story



## 1 CHIEN KOU MARKET HOUSING

It is the policy of the provincial government to provide new housing for squatters before their shacks are cleared away. The Chien Kou Market Housing is a typical case which relocated the squatter settlements along the Lü Chuan Canal. It is centrally located in the city center near Taichung terminal station and only a few blocks from the site of the residents' former homes which now have been planted with trees and flowers to form a kind of "strip park".





## 2 LIU CHUAN CANAL-BANK SETTLEMENT

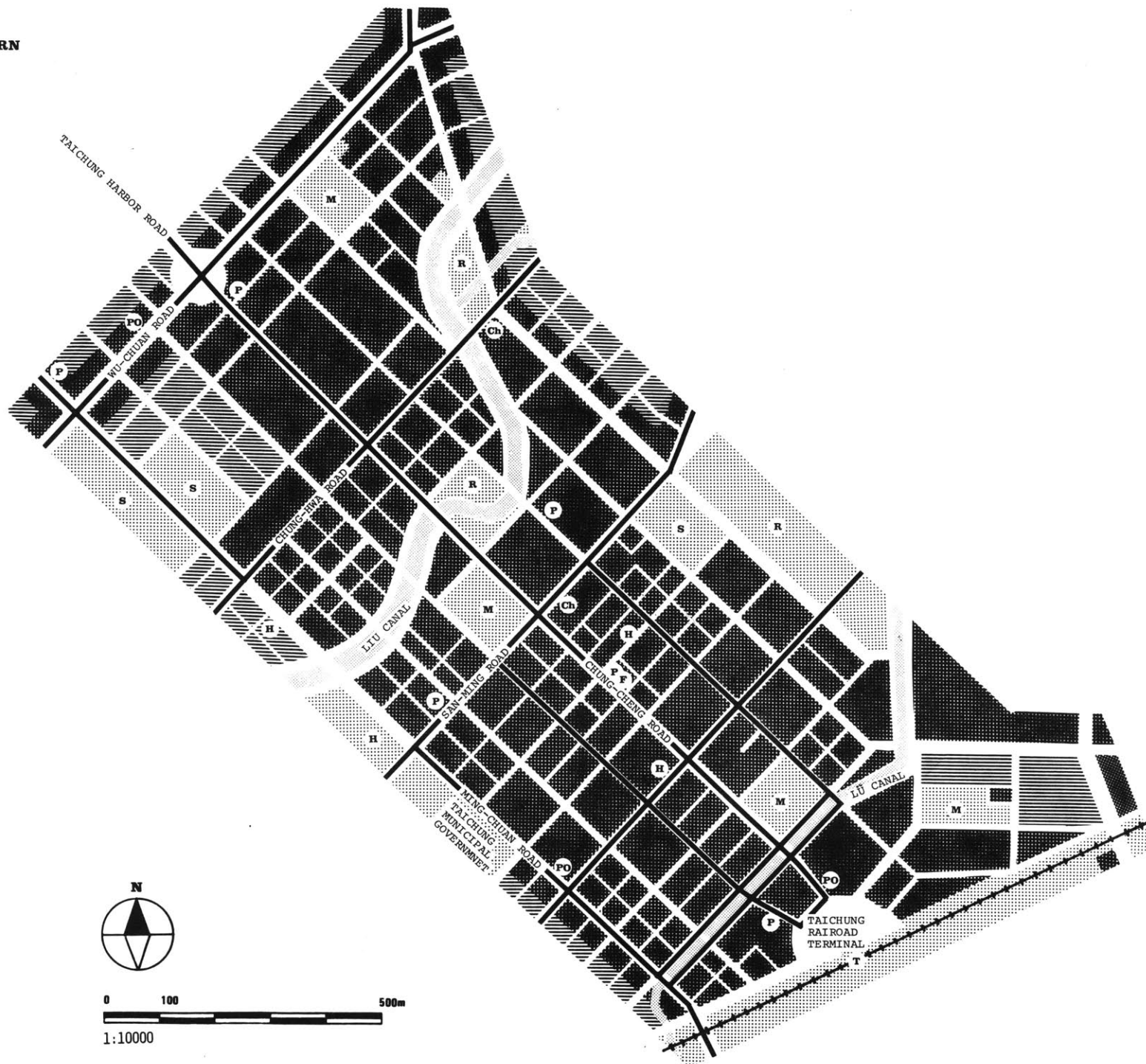
There are several concrete-sided canals, actually small rivers, which wind their way through the city of Taichung. In the central business district, the banks of these canals are closely lined with squatter settlements which are typical cases of progressive developments of low income groups. As shown in the case 1, Lü Chuan has been cleared away and relocated to the Chien Kou Market Housing. Residents of Liu Chuan settlements are waiting for their demolition.

**LOCALITY LAND USE PATTERN**

- 1** CHIEN KOU  
MARKET  
HOUSING
- 2** LIU CHUAN  
CANAL-BANK  
SETTLEMENT

- AREAS
-  RESIDENTIAL
  -  COMMERCIAL
  -  INDUSTRIAL
  -  OPEN SPACES

- KEY
- Pk Parking
  - P Police
  - F Fire Department
  - T Terminal: Bus, Train
  - S School
  - Ch Church
  - R Recreation
  - L Library
  - U University
  - H Health
  - PO Post Office
  - SS Social Services
  - M Market
  - C Cemetery
  -  Bus



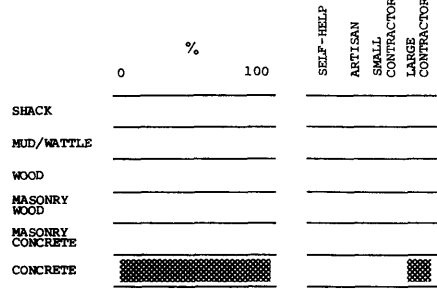


LOCALITY CIRCULATION PATTERN



# 1 CHIEN KOU MARKET HOUSING

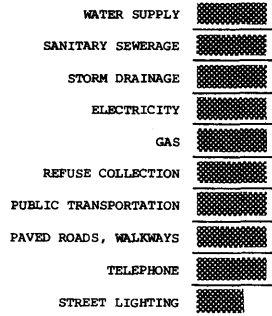
## LOCALITY CONSTRUCTION TYPES



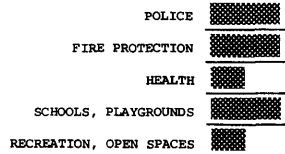
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Accurate

## LOCALITY UTILITIES AND SERVICES

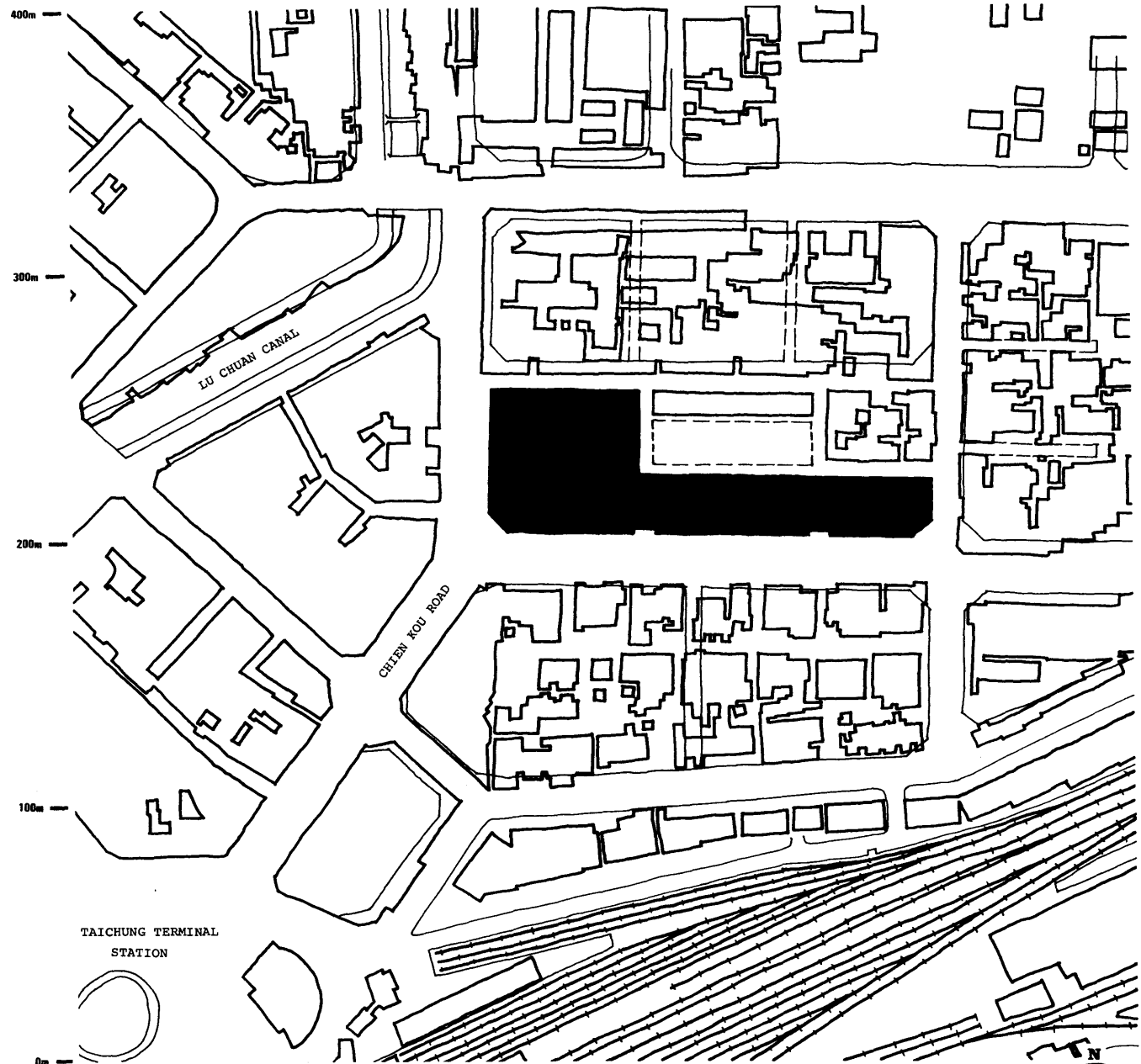


## LOCALITY COMMUNITY FACILITIES



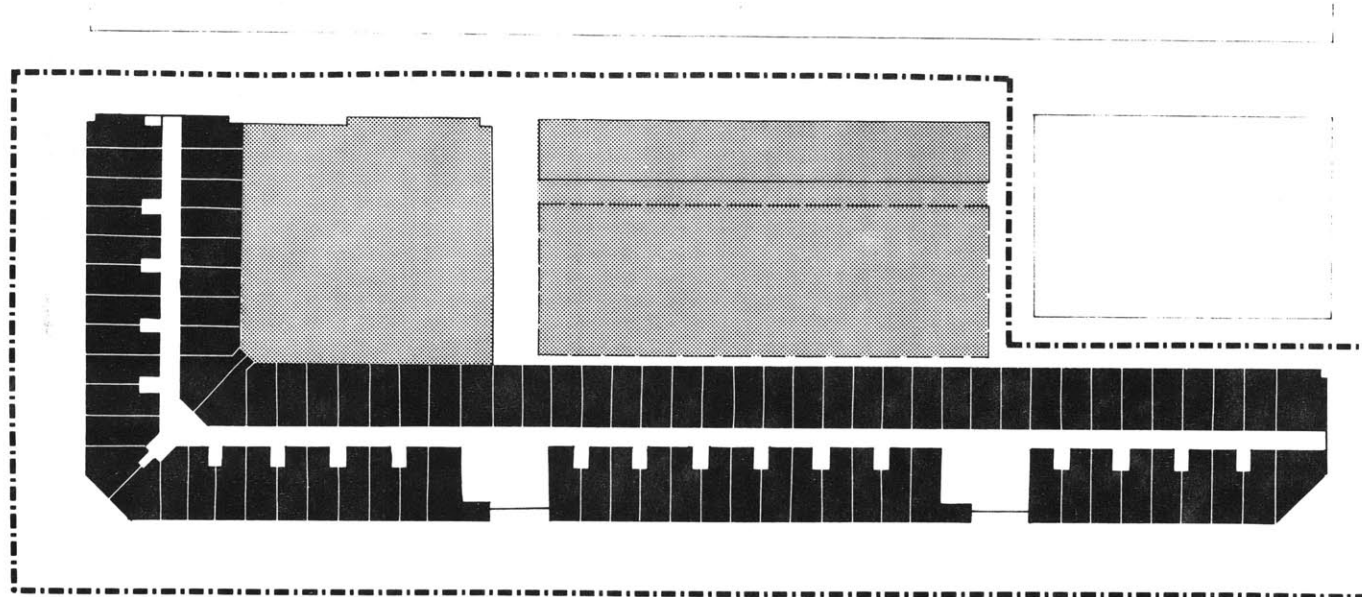
The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Accurate



LOCALITY SEGMENT PLAN





**LOCALITY BLOCK LAND UTILIZATION**

This project is in the form of a large, four story building which occupies almost an entire block. On the ground level and in the center part of the second floor, a retail market is included which contains 20 shops along the side of the street and 369 stand inside the building. On both wings of the second floor, are standard shops along the center corridor. The third and fourth floor are filled with 190 apartment units.

This form of structure/complex recognizes the fact that most of the residents formerly had commercial or industrial operations in their homes, and need a place to carry on their business in the new location.

Under the municipal housing programs'

usual loan plan, all the units are rental and dwelling units are so called "usufruct" but some of them have been sublet by paying "key money". The life style of the residents of this new market housing is similar to their former settlements. But the center corridor which is not exposed to sunshine directly (the third floor corridors are particularly dark, with light coming only through a few small skylights in the fourth floor corridors) is defined as a public area, i.e., it is "no man's land" in the sense of control and responsibility. Clothes are hung to dry, vegetables are washed, garbage is stacked and used furniture is stored here. In the dwelling unit, most of the residents built mezzanines in order to expand their space which is under the minimum standard.



**LOCALITY BLOCK LAND UTILIZATION DATA**

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	90	1.07	84
DWELLING UNITS	199	1.07	186
PEOPLE	955	1.07	892

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.466	43 %
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.604	57 %
SEMI-PRIVATE (cluster courts)	-	-
<b>TOTAL</b>	<b>1.07</b>	<b>100 %</b>

**NETWORK EFFICIENCY**

Network length (streets, walkways) = 331<sup>m</sup>/Ha.  
 Areas served (total area)

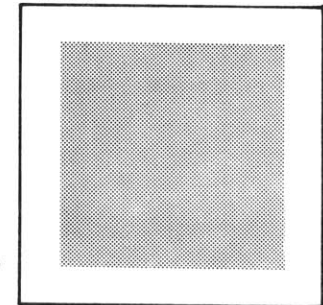
**LOTS**

Average area, dimensions = 36<sup>m</sup>²

**LAND UTILIZATION DIAGRAMS**

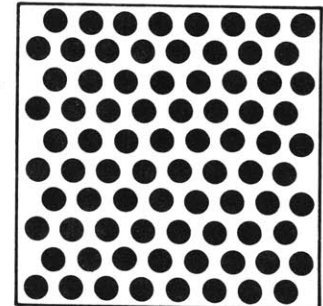
- Public: streets, walkways
- Semi-Public: playgrounds
- Semi-Private: cluster courts
- Private: lots
- dwellings

1 Hectare



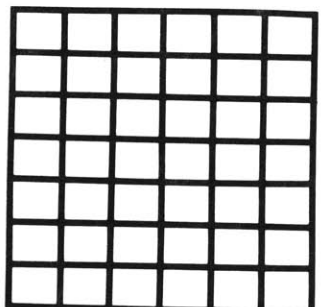
PERCENTAGES	Streets/Walkways	43 %
	Playgrounds	-
	Cluster Courts	-
	Dwellings/Lots	57 %

1 Hectare

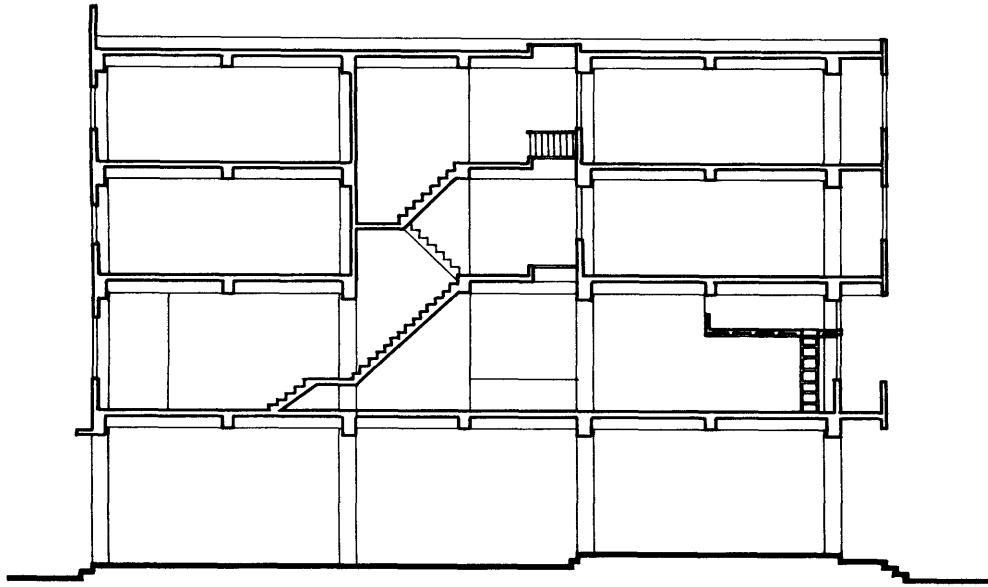


DENSITY 1579 Persons/Hectare

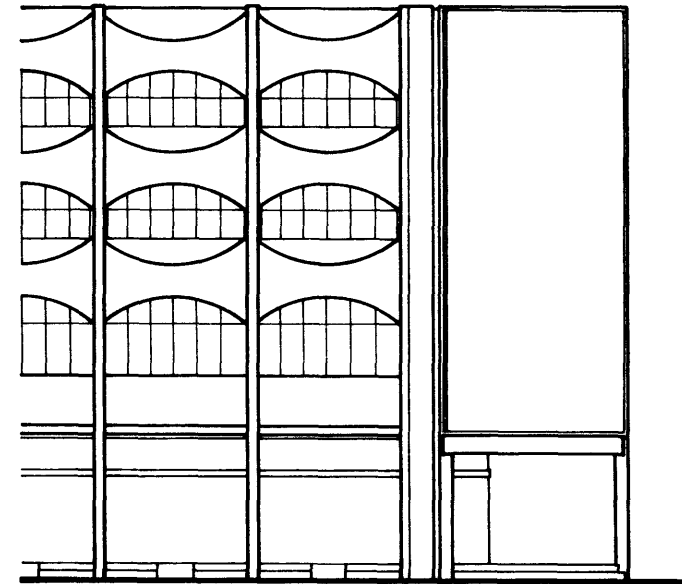
20 Persons



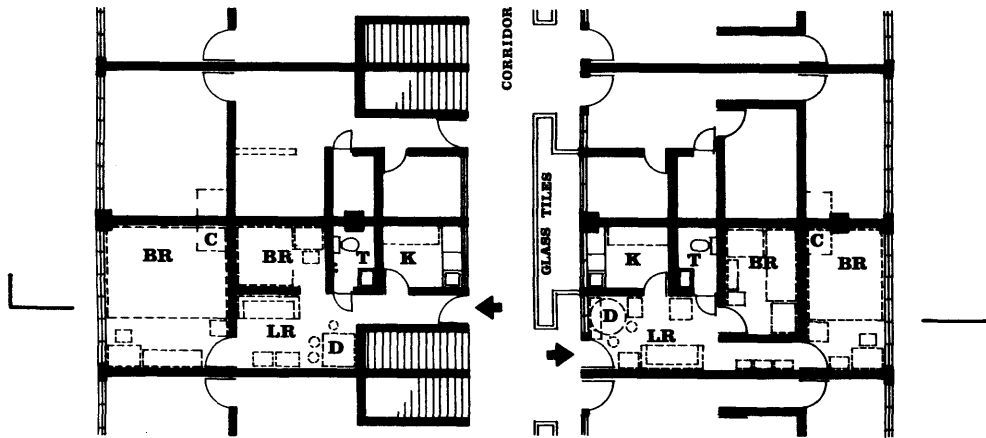
NETWORK EFFICIENCY 331 m/ha.



SECTION



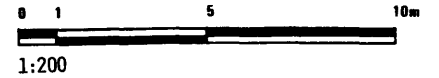
ELEVATION

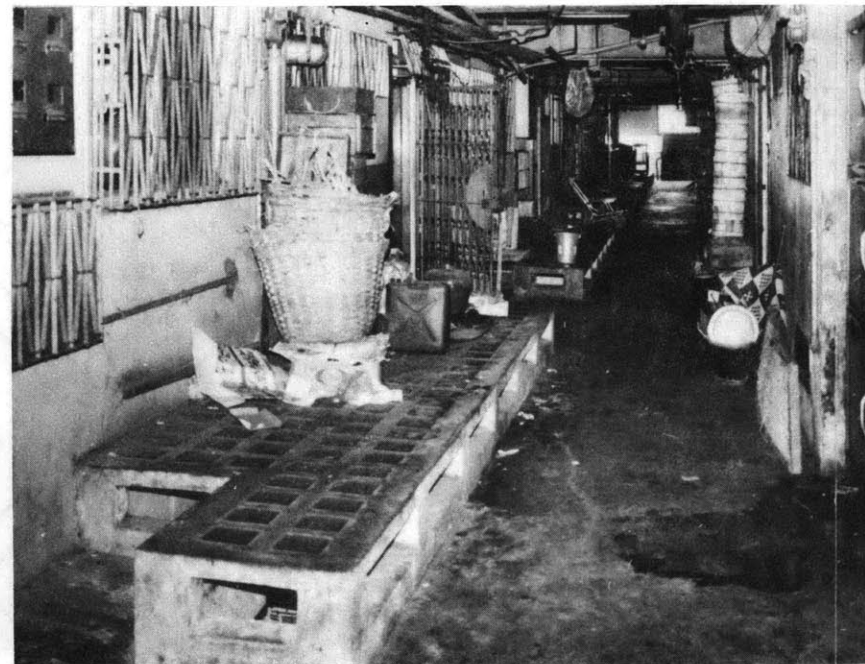
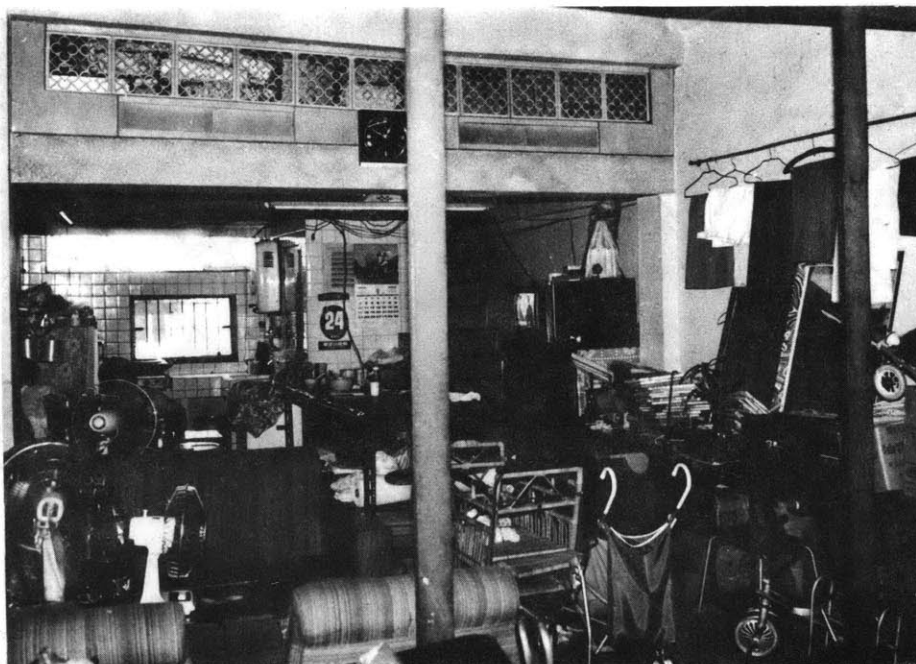


PLAN

TYPICAL DWELLING

- KEY
- LR Living Room
  - D Dining/Eating Area
  - BR Bedroom
  - K Kitchen/Cooking Area
  - T Toilet/Bathroom
  - L Laundry
  - C Closet
  - S Storage
  - R Room (multi-use)





**PHYSICAL DATA**  
(related to dwelling and land)

DWELLING UNIT  
 type: Apartment  
 area (sq m): 36m<sup>2</sup>  
 tenure: Private

LAND/LOT  
 utilization: Public  
 area (sq m): -  
 tenure: Public/usufruct

DWELLING  
 location: City centre  
 type: Walk-up  
 number of floors: 4  
 utilization: Multiple  
 physical state: Crowded, dirty

DWELLING DEVELOPMENT  
 mode: Instant  
 developer: Public  
 builder: Government  
 construction type: R.C.  
 year of construction: 7 years

MATERIALS  
 foundation: R.C.  
 floors: R.C./slab  
 walls: Brick/R.C.  
 roof: R.C.

DWELLING FACILITIES  
 wc: 1  
 shower: -  
 kitchen: 1  
 rooms: 3  
 other: 1

**SOCIO-ECONOMIC DATA**  
(related to user)

GENERAL: SOCIAL  
 user's ethnic origin: Taiwan  
 place of birth: Taichung  
 education level: Primary school

NUMBER OF USERS  
 married: 2  
 single: 3  
 children: 1  
 total: 6

MIGRATION PATTERN  
 number of moves: 1  
 rural - urban: 0  
 urban - urban: 1  
 urban - rural: 0  
 why came to urban area: Living

GENERAL: ECONOMIC  
 user's income group: Low  
 employment: Self  
 distance to work: 0  
 mode of travel: Walk

COSTS  
 dwelling unit: 8000-10000  
 land - market value: -

DWELLING UNIT PAYMENTS  
 financing: Public subsidies  
 rent/mortgage: -  
 % income for rent/mortgage: 23%

(TOP LEFT)

An over-crowded unit on the second floor: The mezzanine is an inevitable addition in the limited space in an apartment unit.

(TOP RIGHT)

The corridor on the fourth floor: "Public Land" with no defined responsibility and resultant deterioration of the living environment.

**CASE STUDY SOURCES**

Land Use Pattern : (Accurate) Taichung Master Plan 1971  
 : (Accurate) Taichung Municipal Government, 1978

Circulation Pattern : (Accurate) IBID  
 Locality Segment Plan : (Accurate) Taichung Municipal Government, 1978

Locality Block Plan : (Accurate) IBID  
 Block Land Utilization : (Accurate) Field Survey, Author, 1978

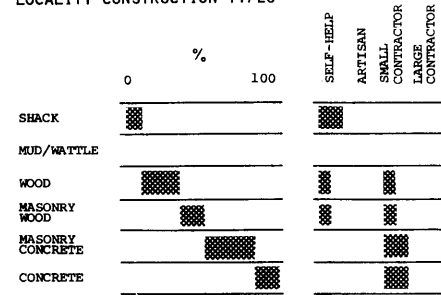
Typical Dwelling : (Accurate) Taichung Municipal Government, 1972

Physical Data : (Approximate) Field Survey, Author, 1978

Socio-Economic Data : (Approximate) IBID  
 Photographs : Author, 1978  
 General Information : Field Survey, Author 1978  
 Good Life, 1976

## 2 LIU CHUAN CANAL-BANK SETTLEMENT

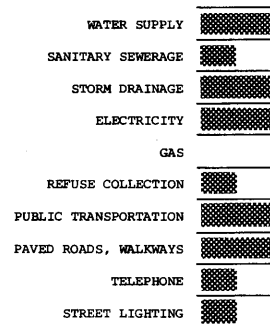
### LOCALITY CONSTRUCTION TYPES



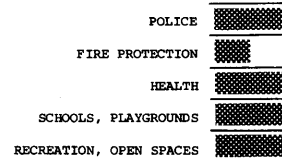
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

### LOCALITY UTILITIES AND SERVICES



### LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate



LOCALITY SEGMENT PLAN

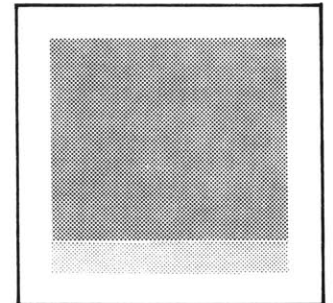
0 50 100 150m  
1:2500



**LAND UTILIZATION DIAGRAMS**

- Public: streets, walkways
- Semi-Public: playgrounds
- Semi-Private: cluster courts
- Private: lots
- dwellings

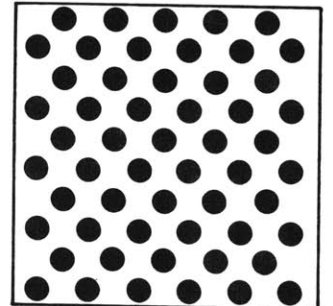
1 Hectare



PERCENTAGES

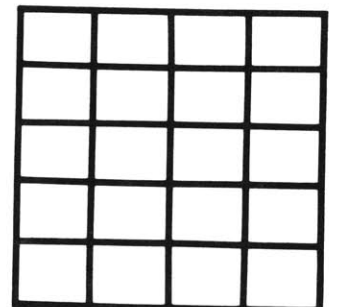
Streets/Walkways	41%
Playgrounds	-
Cluster Courts	8%
Dwellings/Lots	51%

1 Hectare



DENSITY 1090 Persons/Hectare

20 Persons



NETWORK EFFICIENCY 217 m/ha.

**LOCALITY BLOCK LAND UTILIZATION DATA**

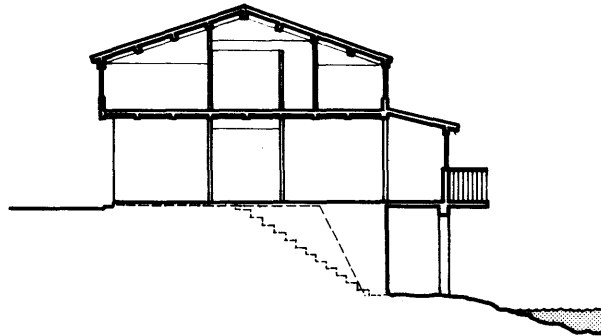
DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	54	.587	92
DWELLING UNITS	63	.587	107
PEOPLE	378	.587	644

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.243	41%
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.299	51%
SEMI-PRIVATE (cluster courts)	.045	8%
<b>TOTAL</b>	<b>.587</b>	<b>100%</b>

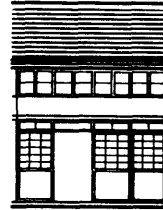
**NETWORK EFFICIENCY**

Network length (streets, walkways) = 217m/ha  
 Areas served (total area)

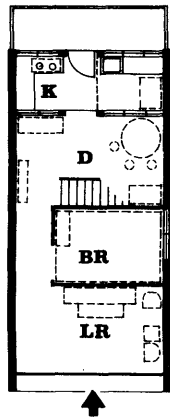
LOTS  
 Average area, dimensions = 45-57m<sup>2</sup>



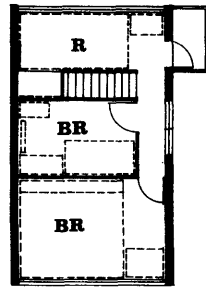
SECTION



ELEVATION



GROUND FLOOR



SECOND FLOOR

PLAN

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)

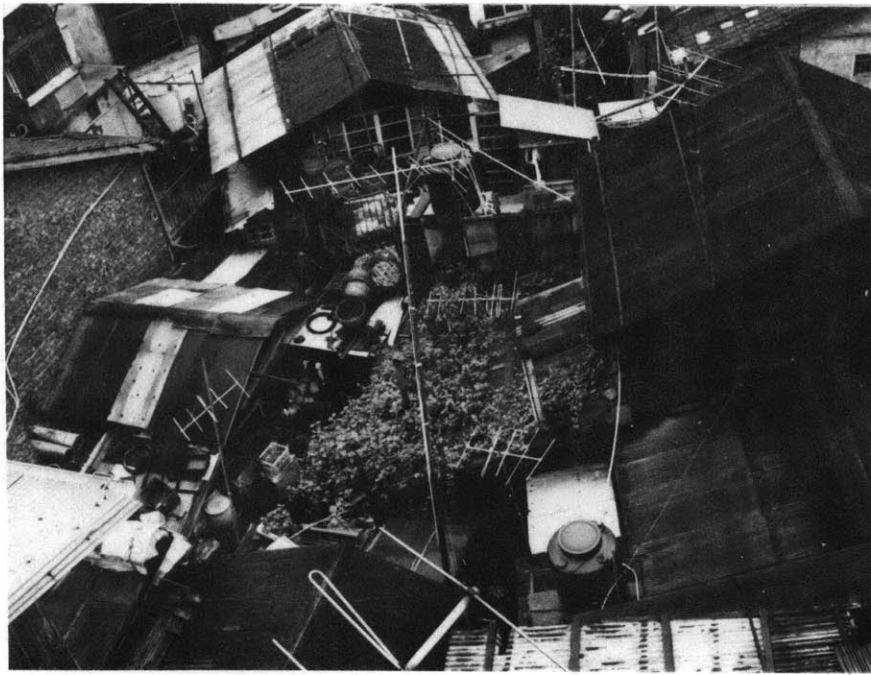


1:200

It is located in the city center around Chung Hwa Road where a lively local night market is situated. Some of them contain small shops, or cottage industries, with living quarters at the back, above, or below. The commercialized units which are located close to main street show a fair degree of affluence and style, and those farther removed from the center of commercial activity appear poorer. The settlements are typically one-story, but some have rudimentary second stories built over the first, or underneath down on the bank. The construction materials vary from wood shanty to masonry/concrete multi-story houses. The occupants predominately stem from two areas. Some of them are natives of the Taichung Prefecture who moved into the urban area for work and settled on the open area adjacent to the river (canal) which was already in a semi-rural stage and on the periphery of old urban area. Another are "mainlander" families who fled to Taiwan in 1949 and who erected emergency shelters along the canal. Most of them have lived here ever since. Through these years, both develop their environment progressively. Public outdoor water pumps and toilets are frequently seen in this area. Some of the waste is disposed directly into the canal, undoubtedly contributing to the great pollution of these streams which are called the "Aggravated Appendix" in the city of Taichung.

TYPICAL DWELLING





**PHYSICAL DATA**  
(related to dwelling and land)

DWELLING UNIT  
 type: Group house  
 area (sq m): 60m<sup>2</sup>  
 tenure: Private

LAND/LOT  
 utilization: Public  
 area (sq m): 48m<sup>2</sup>  
 tenure: Public/governemnt

DWELLING  
 location: City centre  
 type: Group house  
 number of floors: 1-2  
 utilization: Single  
 physical state: Fare

DWELLING DEVELOPMENT  
 mode: Progressive  
 developer: Private/popular  
 builder: Self/s. contractor  
 construction type: Brick masonry  
 year of construction: 54 years

MATERIALS  
 foundation: Concrete/masonry  
 floors: Wood  
 walls: Brick  
 roof: Wood

DWELLING FACILITIES  
 wc: -  
 shower: 1  
 kitchen: 1  
 rooms: 4  
 other:

**SOCIO-ECONOMIC DATA**  
(related to user)

GENERAL: SOCIAL  
 user's ethnic origin: Taichung county  
 place of birth: Taichung  
 education level: High school

NUMBER OF USERS  
 married: 2  
 single: -  
 children: 4-1  
 total: 5

MIGRATION PATTERN  
 number of moves: 2  
 rural - urban: 1  
 urban - urban: 1  
 urban - rural: 0  
 why came to urban area: Convience environment

GENERAL: ECONOMIC  
 user's income group: Low/middle  
 employment: Self  
 distance to work: 1/2Km  
 mode of travel: Walk

COSTS  
 dwelling unit: 3000-6000  
 land - market value: -

DWELLING UNIT PAYMENTS  
 financing: Self  
 rent/mortgage: -  
 % income for rent/mortgage: 22%

(TOP LEFT)

On the rear side of the lot:  
 An effort to annex the dwelling space on the ground in low income settlements is very common.

(TOP RIGHT)

In the front of the lot:  
 An intimate alley is not only for access and local small shops but also provides a neighborhood common space.

**CASE STUDY SOURCES**

Land Use Pattern : (Accurate) Taichung Master Plan 1971  
 : (Accurate) Taichung Municipal Governemtn, 1978

Circulation Pattern : (Accurate) IBID  
 Locality Segment Plan : (Accurate) Taichung Municipal Government, 1978

Locality Block Plan : (Accurate) IBID  
 Block Land Utilization : (Accurate) Field Survey, Author, 1978

Typical Dwelling : (Approximate) Field Survey, Author, 1978

Physical Date : (Approximate) Field Survey, Author, 1978

Socio-Economic Data : (Approximate) Field Survey, Author, 1978

Photographs : Author, 1978  
 General Information : Field Survey, Author 1978  
 Good Life, 1976

### 3 HWEI LAI MILITARY HOUSING

After World War II, Taiwan was returned to China and at the end of its Japanese domination. Central government administrators and military troops were the first group which arrived to take over the island. The most urgent problem in the first few years was the provision of dwellings for their families. In the vicinity of Taichung there are several army and air force bases which generated a large dwelling demand. Hwei Lai Housing, which was constructed near a military storage area is one of those developments established by the military authority.



### 4 SI TUN PRIVATE DEVELOPMENTS





The prosperous private housing development is Situn District is annexing the area which was just released for commercial and residential uses in the Taichung Enlarged Urban Planning, 1978. The existing local center and other separated small dwelling group which includes the military housings, the Teachers' New Village, Tsao Ma and Hwei Lai, are expected to be integrated gradually. The case study was constructed with government incentives for middle-low income local workers by the private sector in 1971.




LOCALITY PLAN



LOCALITY LAND USE PATTERN

- AREAS
-  RESIDENTIAL
  -  COMMERCIAL
  -  INDUSTRIAL
  -  OPEN SPACES

- KEY
- Pk Parking
  - P Police
  - F Fire Department
  - S School
  - A Airport
  - T Terminal: Bus, Train
  - Ch Church
  - R Recreation
  - L Library
  - U University
  - H Health
  - PO Post Office
  - SS Social Services
  - M Market
  - C Cemetery
  -  Bus



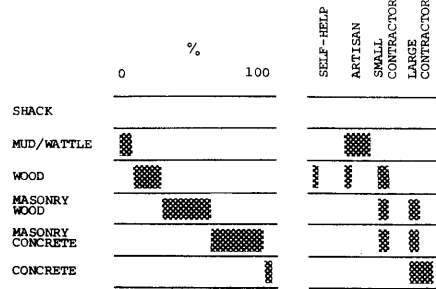
LOCALITY CIRCULATION PATTERN



**3 HWEI LAI  
MILITARY  
HOUSING**

**4 SI TUN  
PRIVATE  
DEVELOPMENTS**

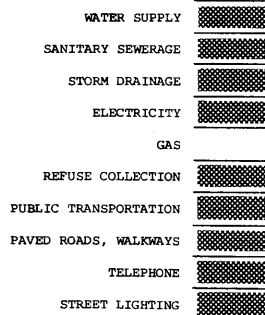
LOCALITY CONSTRUCTION TYPES



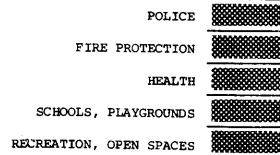
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

LOCALITY UTILITIES AND SERVICES

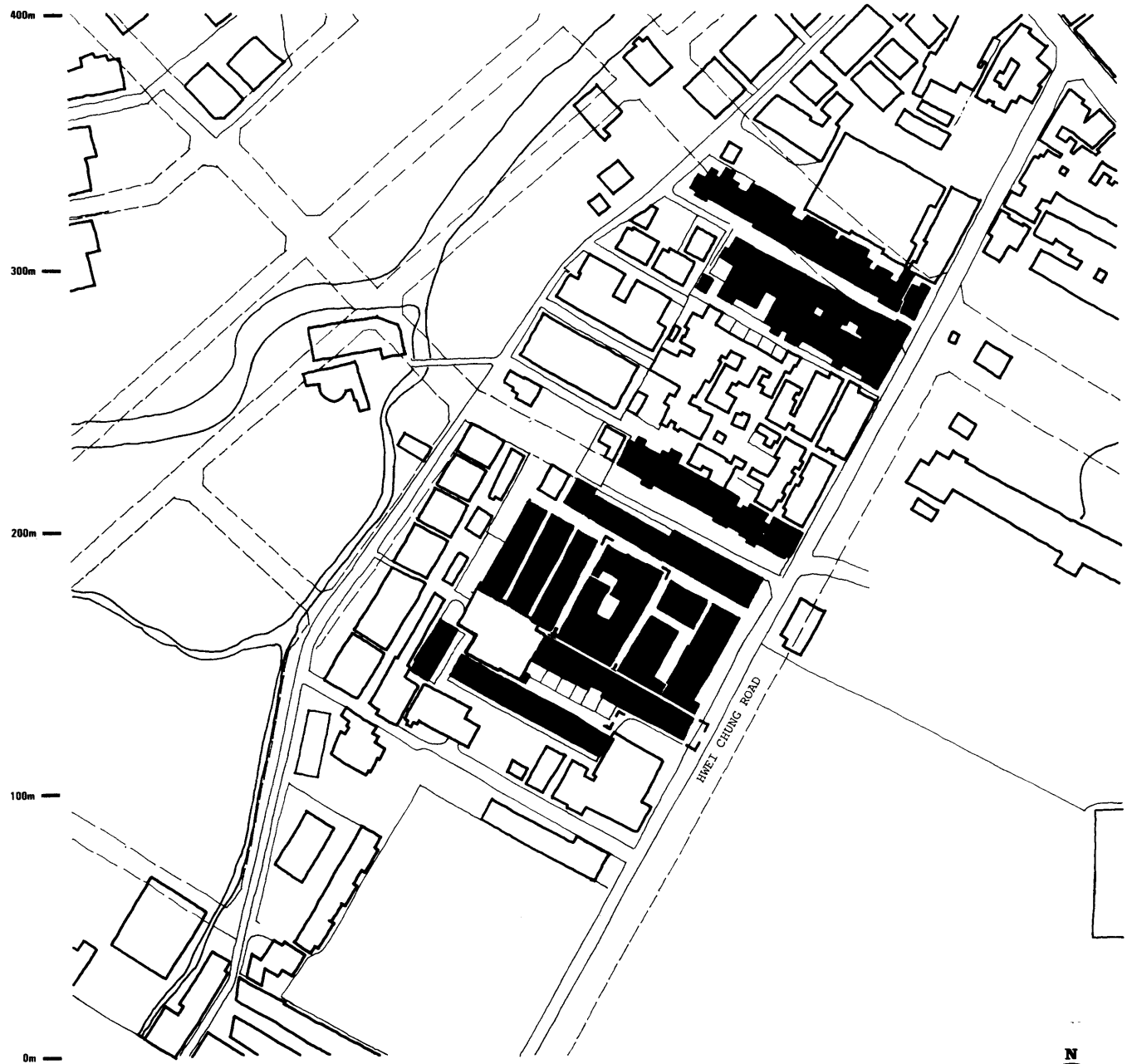


LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate



LOCALITY SEGMENT PLAN



1:2500





**LOCALITY BLOCK LAND UTILIZATION**

**LOCALITY BLOCK LAND UTILIZATION DATA 3**

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	11	0.1	110
DWELLING UNITS	11	0.1	110
PEOPLE	58	0.1	580

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	0.0203	20 %
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	0.0797	80 %
SEMI-PRIVATE (cluster courts)-	-	-
<b>TOTAL</b>	<b>0.1</b>	<b>100 %</b>

**NETWORK EFFICIENCY**

Network length (streets, walkways) = 750m/Ha.  
Areas served (total area)

**LOTS**

Average area, dimensions = 43-81m<sup>2</sup>

**LOCALITY BLOCK LAND UTILIZATION DATA 4**

DENSITIES	Total Number	Area Hectares	Density N/Ha
LOTS	20	.117	170
DWELLING UNITS	20	.117	170
PEOPLE	83	.117	707

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.032	28 %
SEMI-PUBLIC (open spaces, schools, community centers)	-	-
PRIVATE (dwellings, shops, factories, lots)	.085	72 %
SEMI-PRIVATE (cluster courts) -	-	-
<b>TOTAL</b>	<b>.117</b>	<b>100 %</b>

**NETWORK EFFICIENCY**

Network length (streets, walkways) = 849m/Ha  
Areas served (total area)

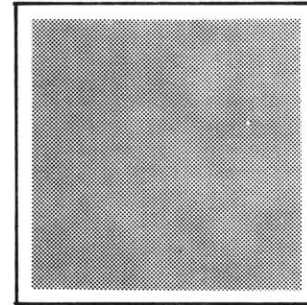
**LOTS**

Average area, dimensions = 42m<sup>2</sup>

**LAND UTILIZATION DIAGRAMS 3**



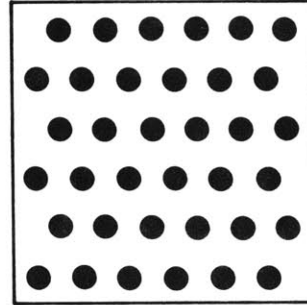
1 Hectare



PERCENTAGES

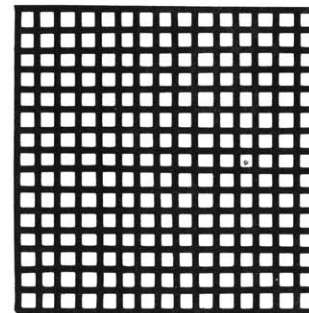
Streets/Walkways	20 %
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	80 %

1 Hectare



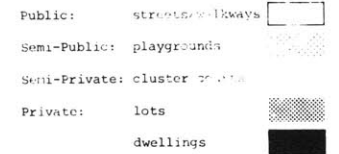
DENSITY 727 Persons/Hectare

● 20 Persons

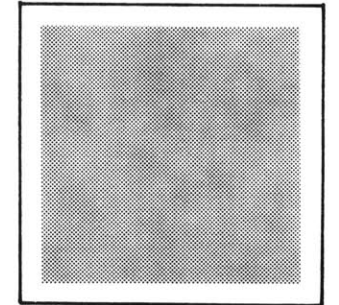


NETWORK EFFICIENCY 750 m/ha. (445)

**LAND UTILIZATION DIAGRAMS 4**



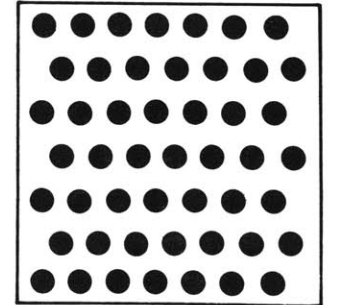
1 Hectare



PERCENTAGES

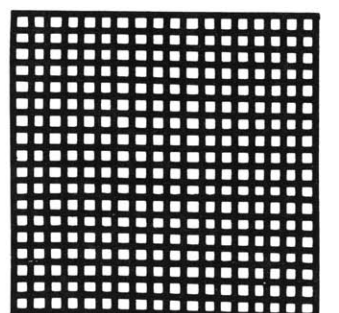
Streets/Walkways	28 %
Playgrounds	-
Cluster Courts	-
Dwellings/Lots	72 %

1 Hectare

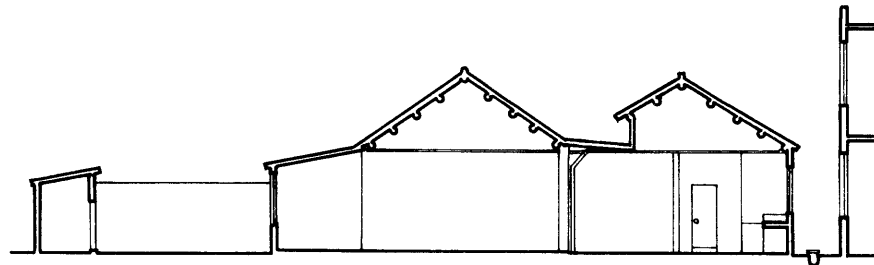


DENSITY 975 Persons/Hectare

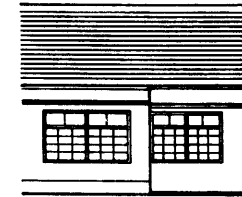
● 20 Persons



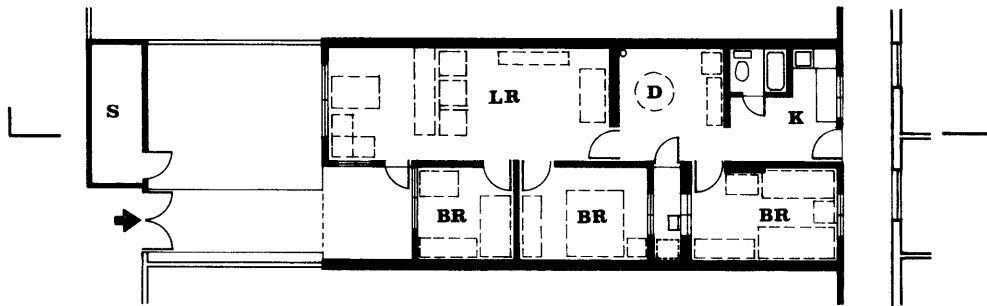
NETWORK EFFICIENCY 849 m/ha. (448)



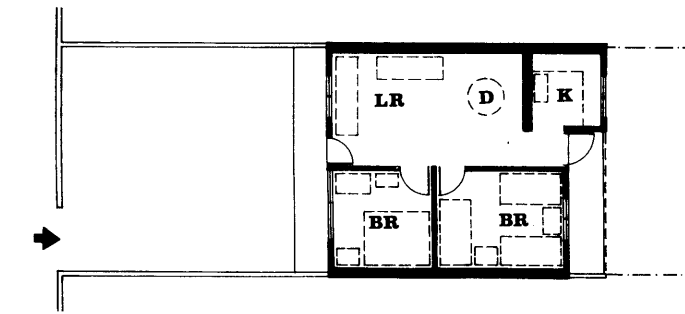
SECTION



ELEVATION



EXISTING STAGE



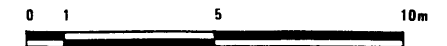
INITIAL STAGE

PLAN

The dwellings were built in masonry and concrete. Initially, each unit contained only three rooms of 42 square meters and a toilet which has located in the backyard shared by the rowhouse residents. Similar to Case 2, dwellings expand through these years. The rigid configuration of the row house restricts the expansion of the building on the front and backyards. On the plan shown, the addition to the rear has already reached its limits.

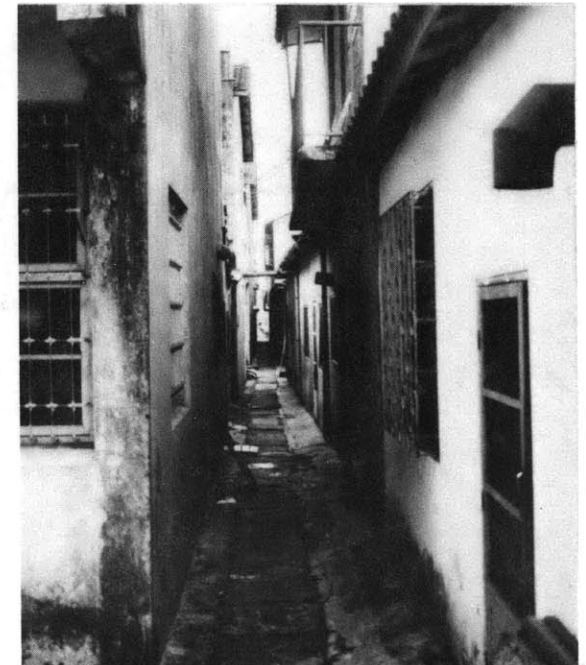
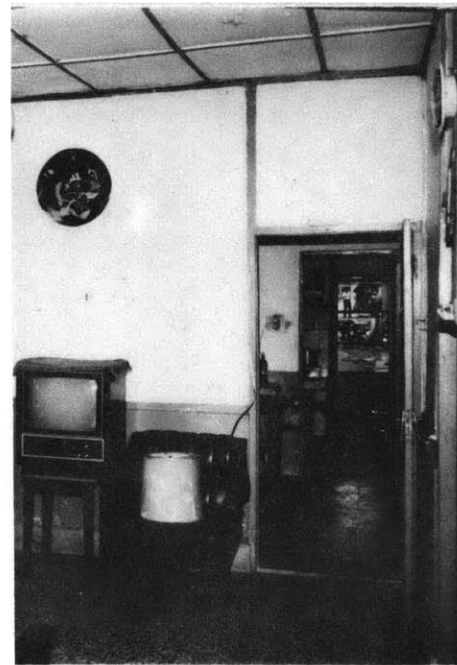
KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



1:200





**PHYSICAL DATA**  
(related to dwelling and land)

**DWELLING UNIT**  
 type: Row-house  
 area (sq m): 58m<sup>2</sup>  
 tenure: Public

**LAND/LOT**  
 utilization: Public  
 area (sq m): 72m<sup>2</sup>  
 tenure: Public/Usufruct

**DWELLING**  
 location: Sub/urb  
 type: Row-house  
 number of floors: 1  
 utilization: Single  
 physical state: -

**DWELLING DEVELOPMENT**  
 mode: Instant/incremental  
 developer: Public  
 builder: Public  
 construction type: Brick/wood  
 year of construction: 25

**MATERIALS**  
 foundation: Brick/concrete  
 floors: Concrete  
 walls: Brick  
 roof: Wood

**DWELLING FACILITIES**  
 wc: 1  
 shower: 1  
 kitchen: 1  
 rooms: 4  
 other: -

**SOCIO-ECONOMIC DATA**  
(related to user)

**GENERAL: SOCIAL**  
 user's ethnic origin: Ho-nan Province  
 place of birth: Ho-nan  
 education level: Military officer

**NUMBER OF USERS**  
 married: 2  
 single: -  
 children: 5  
 total: 7

**MIGRATION PATTERN**  
 number of moves: 1  
 rural - urban: 0  
 urban - urban: 1  
 urban - rural: -  
 why came to urban area: -

**GENERAL: ECONOMIC**  
 user's income group: Middle  
 employment: Government  
 distance to work: 5-10Km  
 mode of travel: Bus/motorcycle

**COSTS**  
 dwelling unit: -  
 land - market value: -

**DWELLING UNIT PAYMENTS**  
 financing: Government  
 rent/mortgage: -  
 % income for rent/mortgage: -

**(TOP LEFT)**

A narrow alley:  
 Residents use it as an extension of their private domain and inspect every intruder.

**(TOP CENTER)**

Inside the dwelling:  
 A series of doors indicates the sequential addition toward the back of the lot.

**(TOP RIGHT)**

Fire Lane:  
 The function is doubtful in the case of these dwellings. In addition, the through passage interrupts the privacy of every adjacent unit.

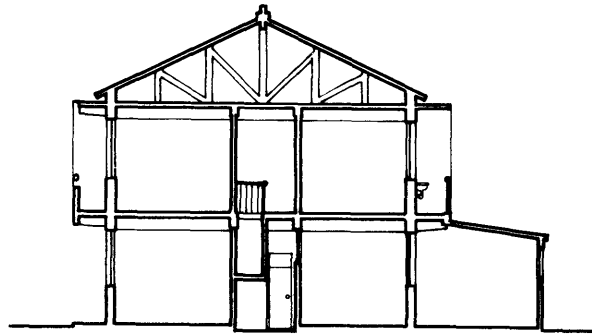
**CASE STUDY SOURCES**

Land Use Pattern : (Accurate) Taichung Master Plan 1971  
 : (accurate) Taichung Municipal Government, 1978

Circulation Pattern : (Accurate) IBID  
 Locality Segment Plan : (Accurate) Taichung Municipal Government

Locality Block Plan : (Approximate) IBID  
 Block Land Utilization : (Accurate) Field Survey, Author 1978

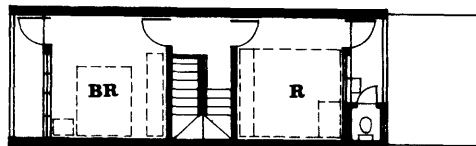
Typical Dwelling : (Approximate) IBID  
 Physical Data : (Approximate) IBID  
 Socio-Economic Data : (Approximate) IBID  
 Photographs : Author, 1978  
 General Information : Field Survey, Author 1978



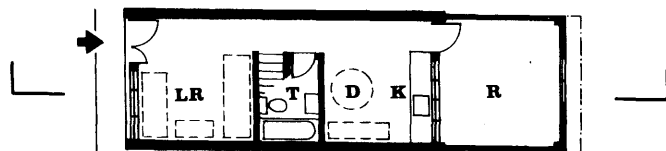
SECTION



ELEVATION



SECOND FLOOR

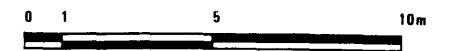


GROUND FLOOR

PLAN

KEY

- LR Living Room
- D Dining/Eating Area
- BR Bedroom
- K Kitchen/Cooking Area
- T Toilet/Bathroom
- L Laundry
- C Closet
- S Storage
- R Room (multi-use)



1:200

TYPICAL DWELLING



#### PHYSICAL DATA (related to dwelling and land)

**DWELLING UNIT**  
 type: Row-house  
 area (sq m): 67m<sup>2</sup>  
 tenure: Private

**LAND/LOT**  
 utilization: Private  
 area (sq m): 42m<sup>2</sup>  
 tenure: Private

**DWELLING**  
 location: Sub-urban  
 type: Row--house  
 number of floors: 2  
 utilization: Single  
 physical state: Good

**DWELLING DEVELOPMENT**  
 mode: Instant  
 developer: Private  
 builder: Small contractor  
 construction type: Concrete  
 year of construction:

**MATERIALS**  
 foundation: R.C.  
 floors: R.C.  
 walls: Brick  
 roof: R.C.

**DWELLING FACILITIES**  
 wc: 2  
 shower: 1  
 kitchen: 1  
 rooms: 3  
 other: 1

#### SOCIO-ECONOMIC DATA (related to user)

**GENERAL: SOCIAL**  
 user's ethnic origin: Taiwan  
 place of birth: Taichung  
 education level: High school

**NUMBER OF USERS**  
 married: 2  
 single: -  
 children: 2  
 total: 4

**MIGRATION PATTERN**  
 number of moves: 3  
 rural - urban: 1  
 urban - urban: 2  
 urban - rural: -  
 why came to urban area: Employment

**GENERAL: ECONOMIC**  
 user's income group: Middle-low  
 employment: Worker  
 distance to work: 4Km  
 mode of travel: Bus/motorcycle

**COSTS**  
 dwelling unit: US\$10000  
 land - market value: -

**DWELLING UNIT PAYMENTS**  
 financing: Private  
 rent/mortgage: -  
 % income for rent/mortgage: 21

(TOP LEFT)

A residential street:  
 The cul-de-sac circulation layout and the lot arrangement discourage commercial activities.

(TOP CENTER)

A commercially oriented alley:  
 The steel "roll-up" doors allow the convenient opening of small shops.

(TOP RIGHT)

At the rear of the dwelling:  
 The reserved open space which was mandated by the building code during the construction is covered and becomes an extra room.

#### CASE STUDY SOURCES

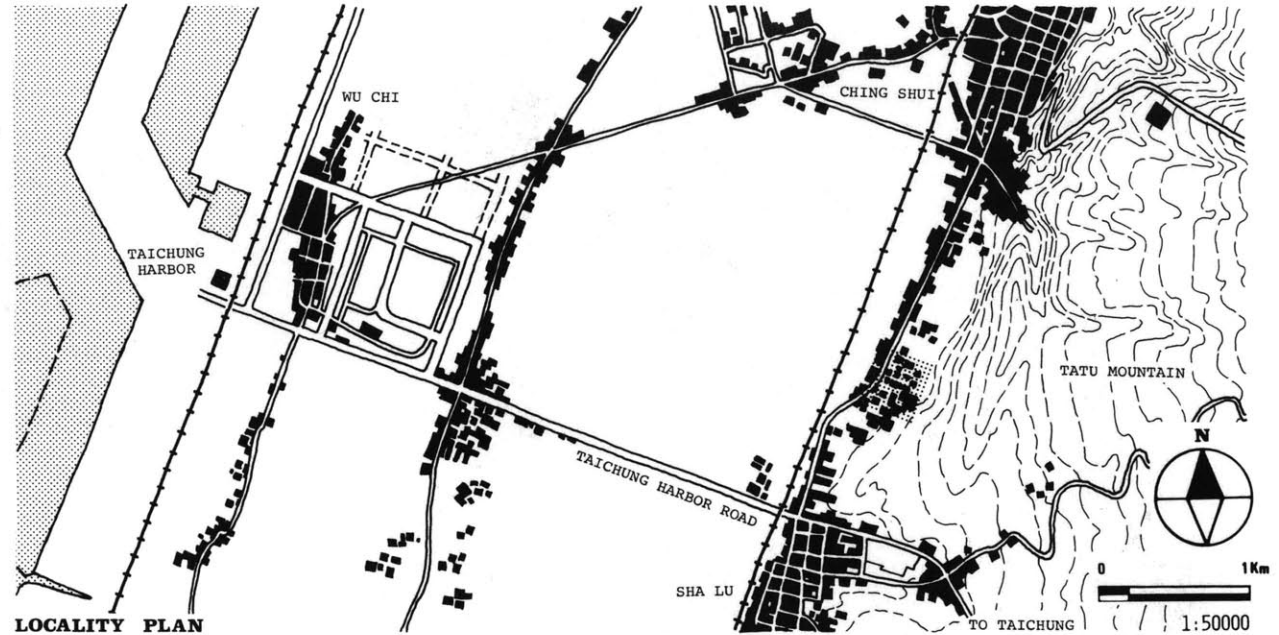
Land Use Pattern : (Accurate) Taichung Master Plan 1971  
 (Accurate) Taichung Municipal Government, 1978

Circulation Pattern : (Accurate) IBID  
 Locality Segment Plan : (Accurate) Taichung Municipal Government

Locality Block Plan : (Approximate) IBID  
 Block Land Utilization : (Accurate) Field Survey, Author 1978

Typical Dwelling : (Approximate) IBID  
 Physical Data : (Approximate) IBID  
 Socio-Economic Data : (Approximate) IBID  
 Photographs : Author, 1978  
 General Information : Field Survey, Author 1978

## 5 LU LIAO SEMI-RURAL SETTLEMENT



This case is selected in the periphery of the Taichung Harbor Special District. It is located between Ching Shui and Sha Lu, adjacent to the main north-south coast line arterial. A rural settlement was developed here approximately 80 years ago. Since then, the growth of Ching Shui, Sha Lu and the west coast plain, especially the on-going THSD development, have experienced a severe change. The inhabitants no longer farm.

Most inhabitants have lived there ever since their parents' first arrived. Since this area has been identified for residential land use in the future, the inhabitants anticipate an unexpected fortune from the increase of land values. Under the circumstances, all the dwellings still remain as they were without any improvement.

Based on the survey data, a few houses are rented to the construction workers of local contractors or the Harbor Bureau for their temporary residence. Because the only public transportation available is the highway bus, a number of them own bicycles or motorcycles.

Though the condition and facilities of the dwellings are not "up to date", the rural style layout provides a good living environment. The enclosed open spaces where there used to be the grain-drying yard has become the children's playground and outdoor common space. Since the settlement is adjacent to the Tatu Mountain to the rear, there is little public through traffic. Most of the surrounding environment, although it is sometimes mud, is maintained by these groups of people, except the north boundary which is a drainage and sewer ditch and considered to be a part of adjacent newly built houses.



LOCALITY LAND USE PATTERN



- AREAS
- RESIDENTIAL
  - COMMERCIAL
  - INDUSTRIAL
  - OPEN SPACES

- KEY
- Pk Parking
  - P Police
  - F Fire Department
  - S School
  - Ch Church
  - R Recreation
  - L Library
  - U University
  - H Health
  - T Terminal: Bus, Train
  - M Market
  - C Cemetery
  - Bus

LOCALITY CIRCULATION PATTERN

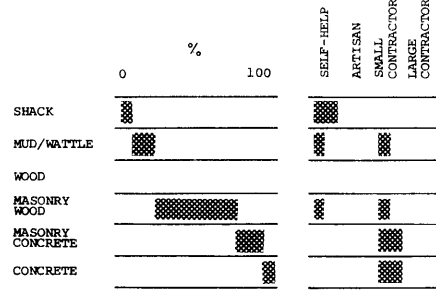


- KEY
- VEHICULAR
  - PEDLSTRIAN



# 5 LU LIAO SEMI-RURAL SETTLEMENT

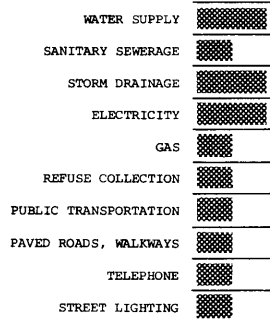
## LOCALITY CONSTRUCTION TYPES



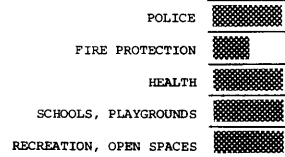
The chart shows (1) approximate percentage of each construction type within the total number of dwellings and (2) building group that generally produces each type.

Quality of information: Approximate

## LOCALITY UTILITIES AND SERVICES



## LOCALITY COMMUNITY FACILITIES



The chart illustrates the approximate availability of utilities, services, and community facilities at three levels: NONE, LIMITED, ADEQUATE.

Quality of information: Approximate



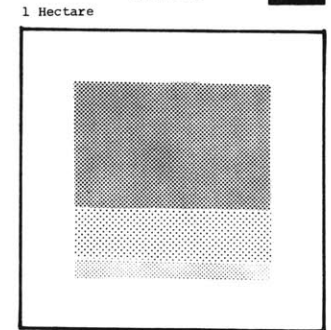
LOCALITY SEGMENT PLAN



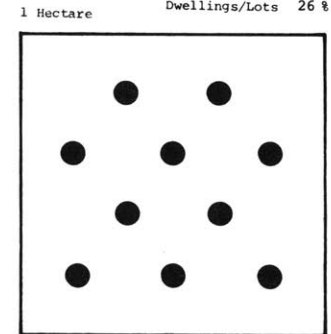


**LAND UTILIZATION DIAGRAMS**

- Public: streets, walkways
- Semi-Public: playgrounds
- Semi-Private: cluster courts
- Private: lots
- dwellings

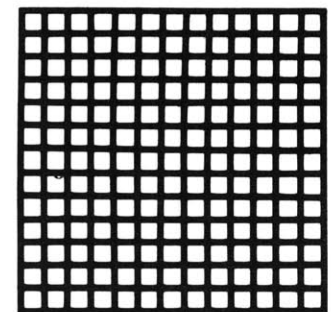


PERCENTAGES Streets/Walkways 57 %  
 Playgrounds 13 %  
 Cluster Courts 4 %  
 Dwellings/Lots 26 %



DENSITY 196 Persons/Hectare

● 20 Persons



NETWORK EFFICIENCY 670 m/ha.

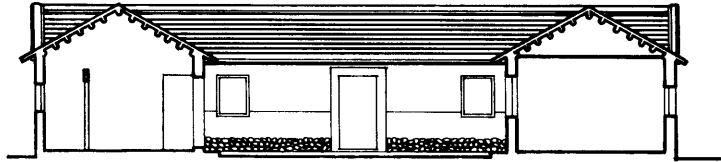
**LOCALITY BLOCK LAND UTILIZATION DATA**

AREAS	Hectares	Percentages
PUBLIC (streets, walkways, open spaces)	.67	57 %
SEMI-PUBLIC (open spaces, schools, community centers)	.16	13 %
PRIVATE (dwellings, shops, factories, lots)	.28	26 %
SEMI-PRIVATE (cluster courts)	.04	4 %
<b>TOTAL</b>	<b>1.15</b>	<b>100 %</b>

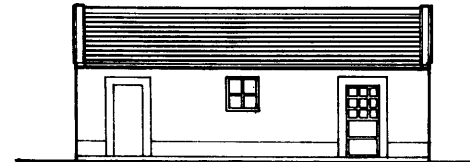
DENSITIES	Total Number	Area Hectares	Density N/ha
LOTS	24	1.15	21
DWELLING UNITS	24	1.15	21
PEOPLE	97	1.15	85

NETWORK EFFICIENCY  
 Network length (streets, walkways) = 670 m/ha.  
 Areas served (total area)

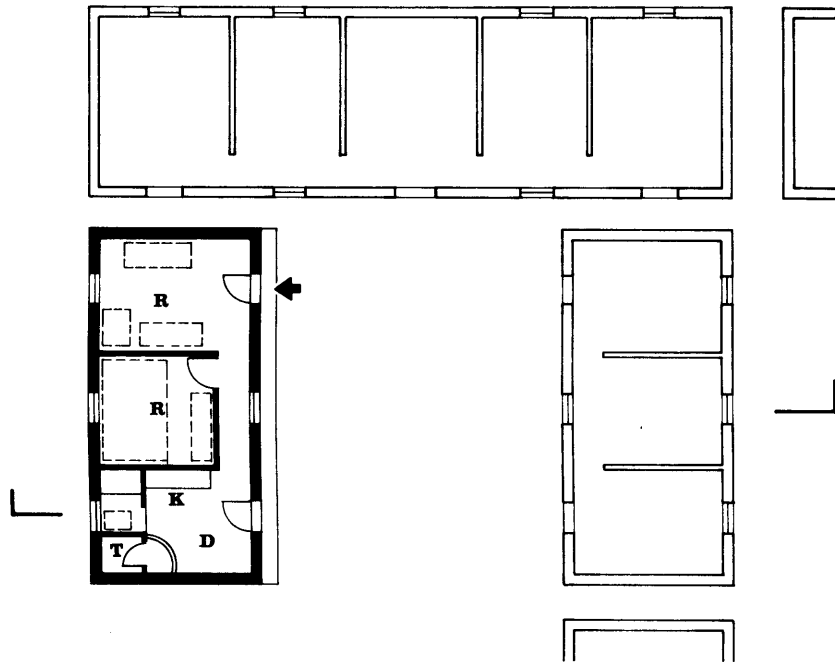
LOTS  
 Average area, dimensions = 206 m<sup>2</sup>



SECTION



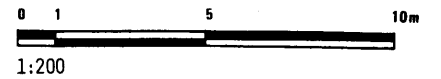
ELEVATION



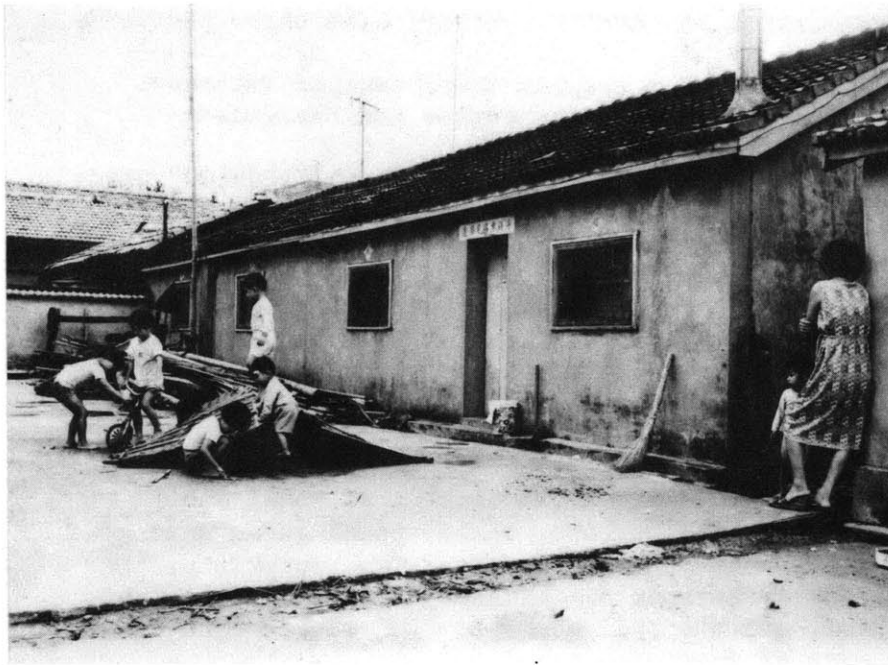
PLAN

TYPICAL DWELLING

- KEY
- LR Living Room
  - D Dining/Eating Area
  - BR Bedroom
  - K Kitchen/Cooking Area
  - T Toilet/Bathroom
  - L Laundry
  - C Closet
  - S Storage
  - R Room (multi-use)







**PHYSICAL DATA**  
(related to dwelling and land)

**DWELLING UNIT**  
 type: Group house  
 area (sq m): 39m<sup>2</sup>  
 tenure: Private

**LAND/LOT**  
 utilization: Private  
 area (sq m): -  
 tenure: Private

**DWELLING**  
 location: Ex-urban  
 location: Group houses  
 type: 1  
 number of floors: Multiple/single  
 utilization: Poor  
 physical state: -

**DWELLING DEVELOPMENT**  
 mode: Progressive  
 developer: Private  
 builder: Artisan  
 construction type: Masonry/wood  
 year of construction: -

**MATERIALS**  
 foundation: Concrete  
 floors: Cement  
 walls: Brick  
 roof: Wood

**DWELLING FACILITIES**  
 wc: 1  
 shower: 1  
 kitchen: 1  
 rooms: 2  
 other: -

**SOCIO-ECONOMIC DATA**  
(related to user)

**GENERAL: SOCIAL**  
 user's ethnic origin: Taichung  
 place of birth: Taichung  
 education level: Junior high school

**NUMBER OF USERS**  
 married: 2  
 single: -  
 children: 2  
 total: 4

**MIGRATION PATTERN**  
 number of moves: 0  
 rural - urban: -  
 urban - urban: -  
 urban - rural: -  
 why came to urban area: -

**GENERAL: ECONOMIC**  
 user's income group: Low  
 employment: Construction worker  
 distance to work: 5km  
 mode of travel: Motorcycle

**COSTS**  
 dwelling unit: -  
 land - market value: -

**DWELLING UNIT PAYMENTS**  
 financing: Private  
 rent/mortgage: -  
 % income for rent/mortgage: -

**(TOP LEFT)**

Enclosed semi-private space:  
 Children are playing under the watchful eye of the parents.

**(TOP RIGHT)**

A neighborhood lane without public trespassing:  
 It serves as a semi-private area where children can play.

**CASE STUDY SOURCES**

Land Use Pattern : (Accurate) Taichung Harbor Area Land Use Survey, 1977  
 Circulation Pattern : (Accurate) IBID  
 Locality Segment Plan : (Accurate) IBID  
 Locality Block Plan : (Approximate) IBID  
 Block Land Utilization : (Accurate) Field Survey, Author 1978  
 Typical Dwelling : (Approximate) Field Survey, Author 1978  
 Physical Data : (Approximate) Field Survey, Author 1978  
 Socio-Economic Data : (Approximate) Field Survey, Author 1978  
 Photographs : Author, 1978  
 General Information : Field Survey, Author 1978

## EVALUATION AND ANALYSIS

The EVALUATION AND ANALYSIS consists of three parts:

**LAND UTILIZATION:** A graphic comparison of Patterns, Percentages, Network Efficiencies and Densities:

**PATTERN:** A selected typical layout in "100x100" grid: It shows the lot configuration, block shape and its circulation layout.

**PERCENTAGE:** The proportion of public and private area: It implies the land utilization in urban layouts; e.g. a large percentage of land for circulation results in high costs of installation per person and extensive maintenance for the public sector.

**NETWORK EFFICIENCY:** A calculation of total public circulation length(streets, lanes, path) in an unit area. It represents the actual circulation intensity, the initial investment on infrastructure of the public sector, and the indication of the private controlable or area of responsibility.

**DENSITY:** Number of persons per hectare. This determines the intensity of land use; e.g. low density means higher cost of development per person.

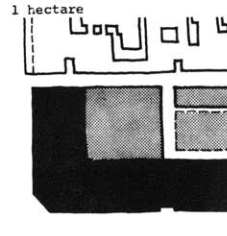
**PHYSICAL DATA MATRIX:** A comparison of the five case studies in terms of the user, dwelling, land and its developments.

**LAND UTILIZATION ANALYSIS:** This is an analysis of existing residential land utilization with the purpose of defining their responsible domains.

# LAND UTILIZATION PATTERNS, PERCENTAGES, NETWORK EFFICIENCIES, AND DENSITIES

## 1 CHIEN KOU MARKET HOUSING

4-story apartment  
instant  
city center



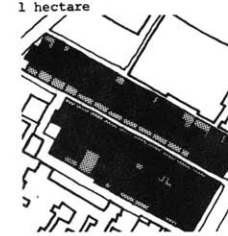
## 2 LIU CHUAN CANAL-BANK SETTLEMENT

1-2 story group houses  
progressive  
city center



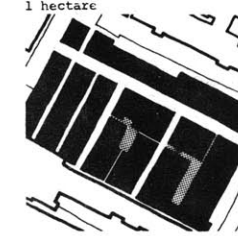
## 3 HWEI LAI MILITARY HOUSING

1-story row houses  
instant  
suburban



## 4 SI TUN PRIVATE DEVELOPMENTS

2-4 story row houses  
instant  
suburban



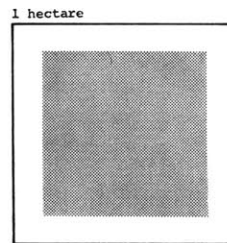
## 5 LU LIAO SEMI-RURAL SETTLEMENT

1-story farm houses  
progressive  
exurban

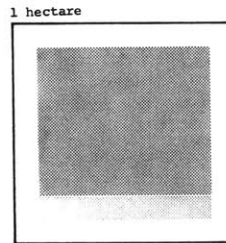


**PERCENTAGES**

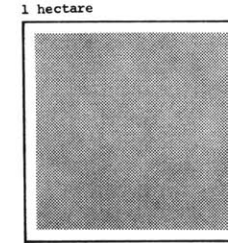
Streets/Walkways  
Playgrounds  
Cluster Courts  
Dwellings/Lots



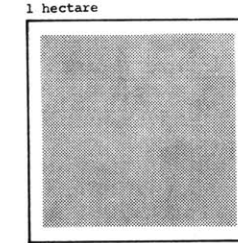
43%  
-  
-  
57%



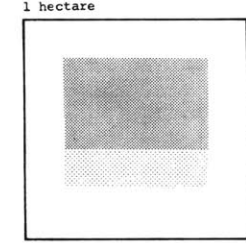
41%  
-  
8%  
51%



20%  
-  
-  
80%

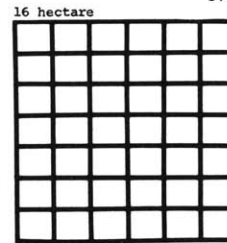


28%  
-  
-  
72%

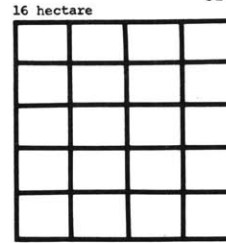


57%  
13%  
4%  
26%

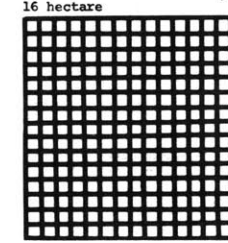
**NETWORK EFFICIENCIES**



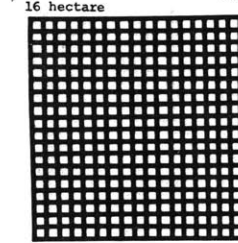
331 m/ha.



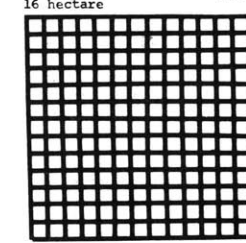
217 m/ha.



750 m/ha.  
(445 m/ha.)



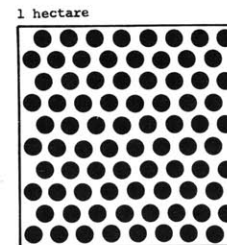
849 m/ha.  
(448 m/ha.)



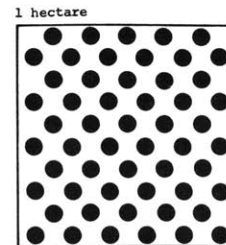
670 m/ha.

**DENSITIES**

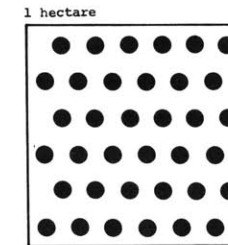
● 20 Persons  
Persons/Hectare



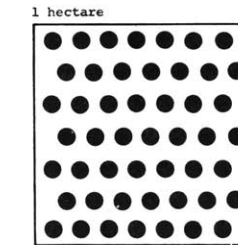
Net: 1579  
(Gross: 892)



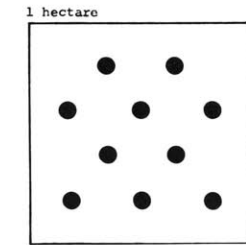
Net: 1090  
(Gross: 644)



Net: 727  
(Gross: 580)



Net: 975  
(Gross: 707)



Net: 196  
(Gross: 85)

# PHYSICAL DATA MATRIX

CASE	LOCATION		USER		POPULATION DENSITY	DWELLING DEVELOPMENT				DWELLING					LAND / LOT			
	City Center Sub-urban Ex-urban	Income Very-low Low Middle High Very-high	DEVELOPER	BUILDER		MODE	CONSTRUCTION TYPE	TENURE	UTILI-ZATION	DWELLING TYPE	NUMBER OF FLOORS	AVERAGE DWELLING SIZE	AVERAGE BUILD-UP AREA	AVERAGE LOT SIZE	ACTUAL LOT COVERAGE	TENURE		
																Public Private Popular	Self-help Artisan Small contractor Large contractor	Instant Progressive
1. CHIEN-KOU MARKET HOUSING										4	36	N.A.	36	N.A.				
2. LIU-CHUAN CANAL-BANK SETTLEMENTS										1-2	60	45	48	93%				
3. HWEI-LAI MILITARY HOUSING										1	58	58	72	80%				
4. SI-TUN PRIVATE DEVELOPMENTS										2	67	38	42	90%				
5. LU-LIAO SEMI-RURAL SETTLEMENT										1	39	N.A.	206	N.A.				

The physical data of the five case studies which illustrates a sequential urban dwelling development in Taichung area, is summarized in this matrix in order to have a spectrum of urbanization and provide a comparison and determination of trend and patterns.

LOCATION: Cases are chosen in three different types of localities: City center, suburban, periphery, in order to represent a sequence of urban environments and the variation of different physical conditions.

USER INCOME GROUP: The study is focused on the low income group. It shows that the range is wider as one approaches the city center.

DENSITY: Population densities are intended as indicators for different cases and locations. The current walk-up apartment provided by the government has a relatively high density.

YEAR OF CONSTRUCTION: It gives an index of the relationship between the development of settlements and the implication of urban planning and building codes. The 5th case was developed in a rural state about 80 years ago.

DEVELOPER: Government provides 4-5 story walk-up apartments in urban areas and 2 story row housing in the periphery for the low income. Private developments with government incentives follow the current policy.

BUILDER: The survey data is based on the existing condition which includes those dwelling additions expanded by the users. Almost all the cases have more than one type of builder. The only exception is the walk-up apartment built by the public sector.

MODE: Progressive mode is only used by very low income and old developments. All current public housing are instant developments.

CONSTRUCTION TYPES: Masonry and concrete is the most common material used in contemporary dwelling construction. Reinforced concrete is used only in multi-story apartments. In addition, masonry/wood construction is often used for small annexes in popular progressive developments.

TENURE: Rental-rooms exist in almost all occasions in order to increase the owner's

income. Tenements house students and workers. As to the public housing, some of the units were occupied by sublessee.

UTILIZATION: In old settlements, traditional multi-family styles still exist. The low percentage show the trend of single family living.

DWELLING TYPE: High-rises for the low income have not been used. Group row houses are the most common types in Taichung, built by the private sector.

NUMBER OF FLOORS: The low income dwellers expand their room by building mezzanines or other simply structured upper level, and sometimes even extended over the canal (case 2). There is no empty area left.

AVERAGE DWELLING SIZE: The public housing provides inadequate space and the inhabitants have no alternative in expanding their room in the apartment unit. The mezzanine becomes the only solution after they have optimized the crowded space by removing the unnecessary items out to the public corridor.

AVERAGE BUILD-UP AREA: This is from the actual survey data which shows the existing stage of housing expansion.

AVERAGE LOT SIZE: The complicated, irregular land subdivision exists in the old settlements which either has developed before there were urban planning or where there was agricultural land initially.

ACTUAL LOT COVERAGE: Government enforces the maximum lot coverage requirement only during the construction of dwellings. It is common that actual coverage is higher than it was, even in middle-income group.

TENURE: Some settlements are in an unstable situation because the land which they occupied has been determined for other uses by local planning authorities. It will be demolished when the date of execution comes.

## LAND UTILIZATION ANALYSIS

	STREET	PRIVATE PLANNED LANE	FIRE LANE	LOT
FUNCTION	-Circulation -Access	-Access -Circulation	-Emergency Access -Fire isolation	-Dwelling -Private yards
OWNERSHIP	-Public	-Private	-Private	-Private
USER	-Crowd -Unlimited number -Anybody	-Crowd/group -Unlimited/limited number -Anybody	-Group -Limited number -Anybody	-Owners -Individual
RESPONSIBLE AGENT	-Public sector	-Co-users -Public sector	-Co-users	-Individual -Users
CONTROL	-Minimum (legal)	-Minimum/partial (legal/physical)	-Partial (legal/physical)	-Complete (legal/physical)
EXISTING SITUATION	-No encroachment  -Public sector maintenance -Provision of infrastructure	-No significant encroachment -Co-users maintenance -Cost of infrastructure shared by co-users -By-pass, "short cut" used by anybody	-Some illegal encroachments -Lack of maintenance -By-pass, "short cut" used by anybody	-Dwelling additions build on front/back yard
CURRENT POLICIES	-Existing bylaw provides government services and control	-Government acquisition after urban replanning	-All new developments require fire lane disregarding the size of lots	-Maximum lot coverage is enforced in all new developments disregarding the size of lots
RECOMMENDED CHANGES	-Lower government's initial investment on infrastructure in new development by improving block/ configuration and minimizing circulation length	-Encourage private lanes owned in condominium  -Use proper layout to encourage group control	-Re-adjust bylaw of fire lane requirement for small lots	-End bylaw requirement of maximum lot coverage for small lots  -Provide semi-private condominium space combined with private lane

This analysis of dwelling environment, is classified into four categories which indicates the existing land utilization in a residential block or segment. Commercial facilities as offices, shops; public facilities as police, government administrations; are considered as private property. Community facilities as parks and schools are considered as semi-public land which is not included in this analysis.

#### STREET:

It is public land which includes roads, lanes, and pedestrian paths providing for access to private lots and the circulation of vehicles and pedestrian. In the urban scale, it acts as a basic network which divides land into blocks. As a residential scale, it gives private dwellings/lots a boundary in sense of control and responsibility. Commercial activities occur along the street in different locations.

#### PRIVATE PLANNED LANE:

It is a piece of land proposed by a private developer for access to those private lots that are not adjacent to any public street. It happens usually in the case of small lots, large blocks, or developments which differ from the original detailed plan proposed by planning authorities. Initially, the government has no obligation in providing utilities and services but it still has the right to prevent illegal encroachments based on the site plan submitted by the private sector before development, and construction. Co-users have to pay for the expenses of any extension of infrastructure and land tax. These lanes sometimes are winding and in various widths in some old settlements which either developed illegally or had developed progressively before there was urban planning. Through the removal or "bulldozer" policy during urban replanning, local governments acquired some of these lanes by civil law, straightened them, made them all a standard width.

#### FIRE LANE:

It is a compulsorily reserved private land on the back or on either side of lots based

on the fire regulations in the building codes. Since it is used for emergency exit/ access and prevention of fire spread, the configuration has to be open to the public land without any obstruction and at least 3m in width. Because of the ambiguity of control, it becomes a "no-man's" area in which flourishes the problem of garbage disposal, sewer gas and even crimes. In the case of small lots, dwellers encroach on these lands and exert their control over this area with fences or even construction in order to expand their inadequate dwelling space. Because of this situation, the practical use of the fire lane is doubtful. The awareness of a fire depends on the specific area concerned, i.e., in the case of small lot, there would be sufficient time to escape. In addition, fire spread can be retarded by using fireproof materials as in the wall/fence separation of lots.

#### LOT:

It is private land which is totally dominated by individual owners with complete legal and physical control. Maximum lot coverage is strictly enforced in the building codes, but generally only during the construction of the dwelling units on the lots. This is not workable in the case of small lots because the most usual alternative for expansion of small dwellings is in building on the private front and back yards which were initially open spaces. Eventually, the lot is almost completely covered and the residents, both old and young, start using the street or land for outdoor activities.

# GLOSSARY

The criteria for the preparation of the definitions have been as follows:

-FIRST PREFERENCE: definitions from "Webster's Third New International Dictionary", Merriam-Webster, 1971.

-SECOND PREFERENCE: definitions from technical dictionaries, text books, or reference manuals.

-THIRD PREFERENCE: definitions from the Urban Settlement Design Program (U.S.D.P.) Files. They are used when existing sources were not quite appropriate/satisfactory.

Words included for specificity and to focus on a particular context are indicated in parenthesis.

Sources of definitions are indicated in parenthesis. (See also: REFERENCES).

**ACCESSES.** The pedestrian/vehicular linkages from/to the site to/from existing or planned approaches (urban streets, limited access highways, public transportation systems, and other systems such as: waterways, airlines, etc.) (U.S.D.P.)

**ACTUAL LAND COST.** "(The cost of land is)...set solely by the level of demand. The price of land is not a function of any cost conditions; it is set by the users themselves in competition." (Turner, 1971)

**AD VALOREM (TAX).** A tax based on a property's value; the value taxed by local governments is not always or even usually the market value, but only a valuation for tax purposes. (U.S.D.P.)

**AIRPORT DISTURBANCE.** The act or process of destroying the rest, tranquility, or settled state of (the site by the annoyance of airport noise, vibration, hazards, etc.) (Merriam-Webster, 1971)

**AIRPORT ZONING RESTRICTIONS.** The regulation of the height or type of structures in the path of moving aircraft. (Abrams, 1971)

**ALTERNATING CURRENT (A.C.)** (an electric) current that reverses its direction of flow at regular intervals. (ROTC ST 45-7, 1953)

**AMENITY.** Something that conduces to physical or material comfort or convenience, or which contributes satisfaction rather than money income to its owner. (Merriam-Webster, 1971)

**AMPERES.** Amperes (amp) are a measure of the rate of flow of electricity. It is somewhat comparable to the rate of flow of water (quantity/time). A steady current produced by one volt applied across a resistance of one ohm. (ROTC ST 45-7, 1953)

**APPRAISAL.** An estimate and opinion of value, especially by one fitted to judge. (Merriam-Webster, 1971)

**APPROACHES.** The main routes external to the site (pedestrian/vehicular) by which the site can be reached from other parts of the urban context. (U.S.D.P.)

**ASSESSED VALUE.** A valuation placed upon property by a public officer or board as a basis for taxation. (Keyes, 1971)

**ASSESSMENT.** The valuation of property for the purpose of levying a tax or the amount of the tax levied. (Keyes, 1971)

**BACKFILL.** Earth or other material used to replace material removed during construction, such as in culvert, sewer, and pipeline trenches and behind bridge abutments and retaining walls or between an old structure and a new lining. (DePina, 1972)

**BARRIER.** (A boundary) as a topographic feature or a physical or psychological quality that tends to separate or restrict the free movement (to and from the site). (Merriam-Webster, 1971)

**BETTERMENT (TAX).** A tax on the increment in value accruing to an owner because of development and improvement work carried out by local authorities. (U.S.D.P.)

**BINDER COURSE.** A transitional layer of bituminous paving between the crushed stone base and the surface course (to increase bond between base and surface course). (DePina, 1972)

**BITUMINOUS.** A coating of or containing bitumin; as asphalt or tar. (DePina, 1972)

**BLOCK.** A block is a portion of land bounded and served by lines of public streets. (U.S.D.P.)

**BOUNDARY.** Something (a line or area) that fixes or indicates a limit or extent (of the site). (Merriam-Webster, 1971)

**BUILDING CODE.** "A body of legislative regulations or by-laws that provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location and maintenance of all buildings and structures within the city, and certain equipment specifically regulated therein." (BOCA, 1967)

**BUILDING DRAIN.** Lowest horizontal piping of the building drainage system receiving discharge from soil, waste, and other drainage pipes. It is connected to the building sewer. (ROTC ST 45-7, 1953)

**BUILDING MAIN.** Water-supply pipe and fittings from the water main or other source of supply to the first branch of the water-distribution system of a building. (ROTC ST 45-7, 1953)

**CESS POOL.** An underground catch basin that is used where there is no sewer and into which household sewage or other liquid waste is drained to permit leaching of the liquid into the surrounding soil. (Merriam-Webster, 1971)

**CIRCULATION.** System(s) of movement/passage of people, goods from place to place; streets, walkways, parking areas. (U.S.D.P.)

**CLAY.** A lusterless colloidal substance, plastic when moist (crystalline grains less than 0.002mm in diameter). (U.S.D.P.)

**CLEANOUT.** A plug or similar fitting to permit access to traps or sewer lines. Cleanouts are usually used at turns and other points of collection. (ROTC ST 45-7, 1953)

**CLIMATE.** The average condition of the weather at a particular place over a period of years as exhibited by temperature, wind, precipitation, sun energy, humidity, etc. (Merriam-Webster, 1971)

**COLLECTION SYSTEM.** The system of pipes in a sewage network, comprised of house service, collection lines, manholes, laterals, mains. (U.S.D.P.)

**COMBINED SEWER.** A sewer that carries both storm water and sanitary or industrial wastes. (DePina, 1972)

**COMMUNITY.** The people living in a particular place or region and usually linked by common interests: the

region itself; any population cluster. (U.S.D.P.)

**COMMUNITY FACILITIES/SERVICES.** Facilities/services used in common by a number of people. It may include: schools, health, recreation, police, fire, public transportation, community center, etc. (U.S.D.P.)

**COMMUNITY RECREATION FACILITIES.** Facilities for activities voluntarily undertaken for pleasure, fun, relaxation, exercise, self-expression, or release from boredom, worry, or tension. (U.S.D.P.)

**COMPONENT.** A constituent part of the utility network. (U.S.D.P.)

**CONDOMINIUM.** Condominium is a system of direct ownership of a single unit in a multi-unit whole. The individual owns the unit in much the same manner as if it were a single family dwelling; he holds direct legal title to the unit and a proportionate interest in the common land and areas. Two types of condominiums are recognized: *HORIZONTAL*: detached, semi-detached, row/grouped dwelling types; *VERTICAL*: walk-up, high-use dwelling types. (U.S.D.P.)

**CONDUCTORS.** Materials which allow current to flow such as aluminum, copper, iron. (ROTC ST 45-7, 1953)

**CONDUIT.** A pipe or other opening, buried or above ground, for conveying hydraulic traffic, pipelines, cables, or other utilities. (DePina, 1972)

**CONSERVATION EASEMENT.** An easement acquired by the public and designed to open privately owned lands for recreational purposes or to restrict the use of private land in order to preserve open space and protect certain natural resources. (U.S.D.P.)

**CONURBATION.** Area of large urban communities where towns, etc. have spread and became joined beyond their administrative boundaries. (A.S. Hornby, A.P. Cowie, J. Windsor Lewis, 1975)

**CONURBATION.** An aggregation or continuous network of urban communities. (Merriam-Webster, 1963)

**CORPORATION COCK/CORPORATION STOP.** A water or gas cock by means of which utility-company employees connect or disconnect service lines to a consumer. (Merriam-Webster, 1971)

**COSTS OF URBANIZATION.** Include the following: *CAPITAL*: cost of land and infrastructure; *OPERATING*: cost of administration, maintenance, etc.; *DIRECT*: include capital and operating costs; *INDIRECT*: include environmental and personal effects. (U.S.D.P.)

**CURRENT** (See: ALTERNATING CURRENT, DIRECT CURRENT). An electric current is a movement of positive or negative electric particles (as electrons) accompanied by such observable effects as the production of heat, of a magnetic field, or of chemical transformation. (Merriam-Webster, 1971)

**CYCLE.** One complete performance of a vibration, electric oscillation, current alternation, or other periodic process. (Merriam-Webster, 1971)

**DAM.** A barrier preventing the flow of water; a barrier built across a water course to confine and keep back flowing water. (Merriam-Webster, 1971)

**DEPRECIATION ACCELERATION (TAX).** A tax incentive designed to encourage new construction by allowing a faster write-off during the early life of a building. (U.S.D.P.)

**DESIGN.** 1) The arrangement of elements that make up a work of art, a machine or other man-made object. 2) The process of selecting the means and contriving the elements, steps, and procedures for producing what will adequately satisfy some need. (Merriam-Webster, 1971)

**DETACHED DWELLING.** Individual dwelling unit, separated from others. (U.S.D.P.)

**DEVELOPMENT.** Gradual advance or growth through progressive changes; a developed tract of land (U.S.D.P.)

**DEVELOPMENT SIZE.** There are two general ranges of size: *LARGE*: may be independent communities requiring their own utilities, services, and community facilities; *SMALL*: generally are part of an adjacent urbanization and can use its supporting utilities, services, and community facilities. (U.S.D.P.)

**DIRECT CURRENT (D.C.)** (An electric current that) flows continuously in one direction. (ROTC ST 45-7, 1953)

**DISCHARGE (Q).** Flow from a culvert, sewer, channel, etc. (DePina, 1972)

**DISTANCE.** The degree or amount of separation between two points (the site and each other element of the urban context) measured along the shortest path adjoining them (paths of travel). (Merriam-Webster, 1971)

**DISTRIBUTION (STATION).** The part of an electric supply system between bulk power sources (as generating stations or transformation station tapped from transmission lines) and the consumers' service switches. (Merriam-Webster, 1971)

**DISTURBED SOIL.** Soils that have been disturbed by artificial process, such as excavation, transportation, and compaction in fill. (U.S.D.P.)

**DRAINAGE.** Interception and removal of ground water or surface water, by artificial or natural means. (De Pina, 1972)

**DUST/DIRT.** Fine dry pulverized particles of earth, grit, refuse, waste, litter, etc. (Merriam-Webster, 1971)

**DWELLING.** The general, global designation of a building/shelter in which people live. A dwelling contains one or more dwelling units. (U.S.D.P.)

**DWELLING BUILDER.** Four groups are considered: *SELF-HELP BUILT*: where the dwelling unit is directly built by the user or occupant; *ARTISAN BUILT*: where the dwelling unit is totally or partially built by a skilled craftsman hired by the user or occupant; payments can be monetary or an exchange of services; *SMALL CONTRACTOR BUILT*: where the dwelling unit is totally built by a small organization hired by the user, occupant, or developer; 'small' contractor is defined by the scale of operations, financially and materially; the scale being limited to the construction of single dwelling units or single complexes; *LARGE CONTRACTOR BUILT*: where the dwelling unit is totally built by a large organization hired by a developer; 'large' contractor is defined by the scale of operations, financially and materially; the scale reflects a more comprehensive and larger size of operations encompassing the building of large quantities of similar units, or a singularly large complex. (U.S.D.P.)

**DWELLING DENSITY.** The number of dwellings, dwelling units, people or families per unit hectare. Gross density is the density of an overall area (ex. including lots, streets). Net density is the density of selected, discrete portions of an area (ex. including only lots). (U.S.D.P.)

**DWELLING DEVELOPER.** Three sectors are considered in the supply of dwellings: *POPULAR SECTOR*: the marginal sector with limited or no access to the formal financial, administrative, legal, technical institutions involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Popular Sector generally for 'self use' and sometimes for profit. *PUBLIC SEC-*



**TOR:** the government or non-profit organizations involved in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Public Sector for service (non-profit or subsidized housing). **PRIVATE SECTOR:** the individuals, groups or societies, who have access to the formal financial, administrative, legal, technical institutions in the provision of dwellings. The housing process (promotion, financing, construction, operation) is carried out by the Private Sector for profit. (U.S.D.P.)

**DWELLING DEVELOPMENT MODE.** Two modes are considered: **PROGRESSIVE:** the construction of the dwelling and the development of the local infrastructure to modern standards by stages, often starting with provisional structures and underdeveloped land. This essentially traditional procedure is generally practiced by squatters with de facto security of tenure and an adequate building site. **INSTANT:** the formal development procedure in which all structures and services are completed before occupation. (U.S.D.P.)

**DWELLING FLOORS.** The following numbers are considered: **ONE:** single story; generally associated with detached, semi-detached and row/group dwelling types. **TWO:** double story; generally associated with detached, semi-detached and row/group dwelling types. **THREE OR MORE:** generally associated with walk-up and high-rise dwelling types. (U.S.D.P.)

**DWELLING GROUP.** The context of the dwelling in its immediate surroundings. (U.S.D.P.)

**DWELLING/LAND SYSTEM.** A distinct dwelling environment/housing situation characterized by its users as well as by its physical environment. (U.S.D.P.)

**DWELLING LOCATION.** Three sectors are considered in single or multi-center urban areas. Sectors are identified by position as well as by the density of buildings as follows: **CENTER:** the area recognized as the business center of the city, generally the most densely built-up sector; **INNER RING:** the area located between the city center and the urban periphery, generally a densely built-up sector; **PERIPHERY:** the area located between the inner ring and the rural areas, generally a scatteredly built-up sector. (U.S.D.P.)

**DWELLING PHYSICAL STATE.** A qualitative evaluation of the physical condition of the dwelling types: room, apartment, house; the shanty unit is not evaluated. **BAD:** generally poor state of structural stability, weather protection, and maintenance. **FAIR:** generally acceptable state of structural stability, weather protection, and maintenance with some deviation. **GOOD:** generally acceptable state of structural stability, weather protection, and maintenance without deviation. (U.S.D.P.)

**DWELLING TYPE.** The physical arrangement of the dwelling unit: **DETACHED:** individual dwelling unit, separated from others. **SEMI-DETACHED:** two dwelling units sharing a common wall (duplex). **ROW/GROUPED:** dwelling units grouped together linearly or in clusters. **WALK-UP:** dwelling units grouped in two to five stories with stairs for vertical circulation. **HIGH-RISE:** dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

**DWELLING UNIT.** A self-contained unit in a dwelling for an individual, a family, or a group. (U.S.D.P.)

**DWELLING UNIT AREA.** The dwelling unit area (m<sup>2</sup>) is the built-up, covered area of a dwelling unit. (U.S.D.P.)

**DWELLING UNIT COST.** The initial amount of money paid for the dwelling unit or the present monetary equivalent for replacing the dwelling unit. (U.S.D.P.)

**DWELLING UNIT TYPE.** Four types of dwelling units are considered: **ROOM:** A SINGLE SPACE usually bounded by

partitions and specifically used for living; for example, a living room, a dining room, a bedroom, but not a bath/toilet, kitchen, laundry, or storage room. **SEVERAL ROOM UNITS** are contained in a building/shelter and share the use of the parcel of land on which they are built (open spaces) as well as common facilities (circulation, toilets, kitchens). **APARTMENT:** A MULTIPLE SPACE (room/set of rooms with bath, kitchen, etc.) **SEVERAL APARTMENT UNITS** are contained in a building and share the use of the parcel of land on which they are built (open spaces) as well as some common facilities (circulation). **HOUSE:** A MULTIPLE SPACE (room/set of rooms with or without bath, kitchen, etc.) **ONE HOUSE UNIT** is contained in a building/shelter and has the private use of the parcel of land on which it is built (open spaces) as well as the facilities available. **SHANTY:** A SINGLE OR MULTIPLE SPACE (small, crudely built). **ONE SHANTY UNIT** is contained in a shelter and shares with other shanties the use of the parcel of land on which they are built (open spaces). (U.S.D.P.)

**DWELLING UTILIZATION.** The utilization indicates the type of use with respect to the number of inhabitants/families. **SINGLE:** an individual or family inhabiting a dwelling. **MULTIPLE:** a group of individuals or families inhabiting a dwelling. (U.S.D.P.)

**EASEMENT.** Servitude: a right in respect of an object (as land owned by one person) in virtue of which the object (land) is subject to a specified use or enjoyment by another person or for the benefit of another thing. (Merriam-Webster, 1971)

**EFFICIENCY.** Capacity to produce desired results with a minimum expenditure of energy, time, money or materials. (Merriam-Webster, 1971)

**EFFLUENT.** Outflow or discharge from a sewer or sewage treatment equipment. (DePina, 1972)

**ELECTRIC FEEDER.** That part of the electric distribution system between the transformer and the service drop or drops. (HUD, Mobile Court Guide, 1970)

**ELECTRIC SERVICE DROP.** That part of the electric distribution system from a feeder to the user's service equipment serving one or more lots. (HUD, Mobile Court Guide, 1970)

**ELECTRIC TRANSFORMER.** A device which changes the magnitude of alternating voltages and currents; generally from distribution voltages to user voltages; a distribution component that converts power to usable voltage. (TM 5 765 US Army, 1970; U.S.D.P.)

**ELECTRICAL CIRCUIT.** A closed, complete electrical path with various connected loads. Circuits may either be 'parallel' (voltage constant for all connected loads) or 'series' (voltage divided among connected loads). Parallel circuits are fixtures wired independent of each other, which are used in nearly all building wiring. (U.S.D.P.; ROTC ST 45-7, 1953)

**ELECTRICAL FREQUENCY.** The number of times an alternating electric current changes direction in a given period of time. Measured in cycles per second: hertz. (ROTC ST 45-7, 1953)

**ELECTRIC GROUND.** The electrical connection with the earth or other ground. (Merriam-Webster, 1971)

**ELECTRICAL NETWORK COMPONENTS.** It is composed of the following: **GENERATION:** produces electricity; **TRANSMISSION:** transports energy to user groups; **DISTRIBUTION STATION:** divides power among main user groups; **SUBSTATION:** manipulates power into useful energy levels for consumption; **DISTRIBUTION NETWORKS:** provides electric service to user. (U.S.D.P.)

**ELECTRIC PHASE.** May be either a single-phase circuit (for small electrical devices) or a three-phase circuit (for heavy equipment, large electrical devices). In single-phase only one current is flowing through

the circuit with the voltage dropping to zero twice in each cycle. In three-phase currents flow through the circuit with the power never dropping to zero. (U.S.D.P.)

**ELECTRICAL POWER.** The source or means of supplying energy for use; measured in watts. (U.S.D.P.)

**ELECTRICAL WIRING SYSTEMS.** May either be single-phase or three-phase. **SINGLE-PHASE:** 2 hot wires with 1 neutral wire; **THREE-PHASE:** 3 hot wires with 1 neutral wire. (ROTC ST 45-7, 1953)

**ELECTRICITY.** Electrification: the process (network) for supplying (the site) with electric power. (Merriam-Webster, 1971)

**EMBANKMENT (or FILL).** A bank of earth, rock, or other material constructed above the natural ground surface. (DePina, 1972)

**EROSION.** The general process whereby materials of the earth's crust are worn away and removed by natural agencies including weathering, solution, corrosion, and transportation; (specific) land destruction and simultaneous removal of particles (as of soil) by running water, waves and currents, moving ice, or wind. (Merriam-Webster, 1971)

**EXCRETA.** Waste matter eliminated from the body. (U.S.D.P.)

**EXISTING STRUCTURE.** Something constructed or built (on the site). (U.S.D.P.)

**EXPLORATORY BORING.** Initial subsurface investigations (borings) are done on a grid superimposed on the areas of interest and on areas indicated as limited/restricted/hazard in the initial survey. (U.S.D.P.)

**EXTERIOR CIRCULATION/ACCESSES (SITE PLANNING).** The existing and proposed circulation system/accesses outside but affecting the site. These include limited access highways as well as meshing access to the surrounding area. Exterior circulation/accesses are generally given conditions. (U.S.D.P.)

**FAUCET (also TAP).** A fixture for drawing liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

**FINANCING.** The process of raising or providing funds. **SELF FINANCED:** provided by own funds; **PRIVATE/PUBLIC FINANCED:** provided by loan; **PUBLIC SUBSIDIZED:** provided by grant or aid. (U.S.D.P.)

**FIRE/EXPLOSION HAZARDS.** Danger: the state of being exposed to harm; liable to injury, pain, or loss from fire/explosion (at or near the site). (Merriam-Webster, 1971)

**FIRE FLOW.** The quantity (in time) of water available for fire-protection purposes in excess of that required for other purposes. (Merriam-Webster, 1971)

**FIRE HYDRANT.** A water tap to which fire hoses are connected in order to smother fires. (U.S.D.P.)

**FIRE PROTECTION.** Measures and practices for preventing or reducing injury and loss of life or property by fire. (Merriam-Webster, 1971)

**FLEXIBLE PAVEMENT.** A pavement structure which maintains intimate contact with and distributes loads to the subgrade and depends upon aggregate interlock, particle friction, and cohesion for stability. (DePina, 1972)

**FLOODING.** A rising and overflowing of a body of water that covers land not usually under water. (U.S.D.P.)

**FLOODWAY FRINGE.** The floodplain area landward of the natural floodway which would be inundated by low velocity flood waters. (U.S.D.P.)

**FLOW METER.** A device to measure flow of water. (U.S.D.P.)

**FLUSH TANK TOILET.** Toilet with storage tank of water used for flushing bowl. (U.S.D.P.)

**FLUSH VALVE TOILET.** Toilet with self-closing valve which supplies water directly from pipe. It requires adequate pressure for proper functioning. (U.S.D.P.)

**FOOT CANDLE.** A unit of illumination on a surface that is everywhere one foot from a uniform point source of light of one candle and equal to one lumen per square foot. (Merriam-Webster, 1971)

**FUMES.** Gaseous emissions that are usually odorous and sometimes noxious. (Merriam-Webster, 1971)

**GAS.** A system for supplying natural gas, manufactured gas, or liquefied petroleum gas to the site and individual users. (U.S.D.P.)

**GRADE.** Profile of the center of a roadway, or the invert of a culvert or sewer. (DePina, 1972)

**GRID BLOCKS.** The block determined by a convenient public circulation and not by dimensions of lots. In grid blocks some lots have indirect access to public streets. (U.S.D.P.)

**GRIDIRON BLOCKS.** The blocks determined by the dimensions of the lots. In gridiron blocks all the lots have direct access to public streets. (U.S.D.P.)

**GRID LAYOUTS.** The urban layouts with grid blocks. (U.S.D.P.)

**GRIDIRON LAYOUTS.** The urban layouts with gridiron blocks. (U.S.D.P.)

**GOVERNMENT/MUNICIPAL REGULATIONS.** In urban areas, the development of the physical environment is a process usually controlled by a government/municipality through all or some of the following regulations: Master Plan, Zoning Ordinance, Subdivision Regulations, Building Code. (U.S.D.P.)

**HEAD.** (Static). The height of water above any plane or point of reference. Head in feet = (lb/sq. in. x 144)/(Density in lb/cu. ft.) For water at 68°F. (DePina, 1972)

**HIGH-RISE.** Dwelling units grouped in five or more stories with stairs and lifts for vertical circulation. (U.S.D.P.)

**HOT WIRE.** Wire carrying voltage between itself and a ground. (ROTC ST 45-7, 1953)

**HYDRAULICS.** That branch of science or engineering that deals with water or other fluid in motion. (DePina, 1972)

**ILLEGAL.** That which is contrary to or violating a rule or regulation or something having the force of law. (Merriam-Webster, 1971)

**INCOME.** The amount (measured in money) of gains from capital or labor. The amount of such gain received by a family per year may be used as an indicator of income groups. (U.S.D.P.)

**INCOME GROUPS.** A group of people or families within the same range of incomes. (U.S.D.P.)

**INCREMENT (TAX).** A special tax on the increased value of land, which is due to no labor/expenditure by the owner, but rather to natural causes such as the increase of population, general progress of society, etc. (U.S.D.P.)

**INFRASTRUCTURE.** The underlying foundation or basic framework for utilities and services: streets; sewage, water network; storm drainage, electrical network;

- gas network; telephone network, public transportation; police and fire protection; refuse collection, health, schools, playgrounds, parks, open spaces. (U.S.D.P.)
- INSULATOR.** A material or body that is a poor conductor of electricity, heat, or sound. (Merriam-Webster, 1971)
- INTERIOR CIRCULATION NETWORK (SITE PLANNING).** The pedestrian/vehicular circulation system inside the site. It should be designed based upon the exterior circulation/accesses and land development requirements. (U.S.D.P.)
- INTERVAL.** A space of time (or distance) between the recurrences of similar conditions or states. (Merriam-Webster, 1971)
- KILOWATT (kw).** (1000 watts) A convenient manner of expressing large wattages. Kilowatt hours (kwh) measure the total quantity of energy consumed in a given time. One kwh represents the use of an average of 1 kilowatt of electrical energy for a period of 1 hour. (ROTC ST 45-7, 1953)
- LAMPHOLE.** A vertical pipe or shaft leading from the surface of the ground to a sewer, for admitting light for purposes of inspection. (U.S.D.P.)
- LAND COST.** Price: the amount of money given or set as the amount to be given as a consideration for the sale of a specific thing (the site). (Merriam-Webster, 1971)
- LAND DEVELOPMENT COSTS.** The costs of making raw land ready for development through the provision of utilities, services, accesses, etc. (U.S.D.P.)
- LAND LEASE.** The renting of land for a term of years for an agreed sum; leases of land may run as long as 99 years. (U.S.D.P.)
- LAND-MARKET VALUE.** Refers to: 1) the present monetary equivalent to replace the land; 2) the present tax based value of the land; or 3) the present commercial market value of the land. (U.S.D.P.)
- LAND OWNERSHIP.** The exclusive right of control and possession of a parcel of land. (U.S.D.P.)
- LAND SUBDIVISION.** The division of the land in blocks, lots and laying out streets. (U.S.D.P.)
- LAND TENANCY.** The temporary holding or mode of holding a parcel of land of another. (U.S.D.P.)
- LAND UTILIZATION.** A qualification of the land around a dwelling in relation to user, physical controls and responsibility. **PUBLIC** (streets, walkways, open spaces): user - anyone/unlimited; physical controls - minimum: responsibility - public sector. **SEMI-PUBLIC** (open spaces, playgrounds, schools): user - limited group of people; physical controls - partial or complete; responsibility - public sector and user. **PRIVATE** (dwellings, lots): user - owner or tenant or squatter; physical controls - complete; responsibility - user. **SEMI-PRIVATE** (cluster courts): user - group of owners and/or tenants; physical controls - partial or complete; responsibility - user. (U.S.D.P.)
- LAND UTILIZATION: PHYSICAL CONTROLS.** The physical/legal means or methods of directing, regulating, and coordinating the use and maintenance of land by the owners/users. (U.S.D.P.)
- LAND UTILIZATION: RESPONSIBILITY.** The quality/state of being morally/legally responsible for the use and maintenance of land by the owners/users. (U.S.D.P.)
- LATERAL SEWER.** A collector pipe receiving sewage from building connection only. (U.S.D.P.)
- LATRINE.** A receptacle (as a pit in the earth or a water closet) for use in defecation and urination, or a room (as in a barracks or hospital) or enclosure (as in a camp) containing such a receptacle. (Merriam-Webster, 1971)
- LAYOUT.** The plan or design or arrangement of something that is laid out. (Merriam-Webster, 1971)
- LEVELS OF SERVICES.** Two levels are considered: **MINIMUM**, are admissible or possible levels below the standard; **STANDARD**, are levels set up and established by authority, custom of general consent, as a model, example or rule for the measure of quantity, weight extent, value or quality. (U.S.D.P.)
- LIFT PUMP.** A collection system component that forces sewage to a higher elevation to avoid deep pipe networks. (U.S.D.P.)
- LOCALITY.** A relatively self-contained residential area/community/neighborhood/settlement within an urban area which may contain one or more dwelling/land systems. (U.S.D.P.)
- LOCALITY SEGMENT.** A 400m x 400m area taken from and representing the residential character and layout of a locality. (U.S.D.P.)
- LOCATION.** Situation: the way in which something (the site) is placed in relation to its surroundings (the urban context). (Merriam-Webster, 1971)
- LOT.** A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)
- LOT CLUSTER.** A group of lots (owned individually) around a semipublic common court (owned in condominium). (U.S.D.P.)
- LOT COVERAGE.** The ratio of building area to the total lot area. (U.S.D.P.)
- LOT PROPORTION.** The ratio of lot width to lot depth. (U.S.D.P.)
- LUMINAIRE.** In highway lighting, a complete lighting device consisting of a light source, plus a globe, reflector, refractor, housing and such support as is integral with the housing. (DePina, 1972)
- MANHOLE.** An access hole sized for a man to enter, particularly in sewer and storm drainage pipe systems for cleaning, maintenance and inspection. (U.S.D.P.)
- MATRIX (OF BASIC REFERENCE MODELS).** A set of models of urban layouts arranged in rows and columns. (U.S.D.P.)
- MASTER PLAN.** A comprehensive, long range plan intended to guide the growth and development of a city, town or region, expressing official contemplations on the course its transportation, housing and community facilities should take, and making proposals for industrial settlement, commerce, population distribution and other aspects of growth and development. (Abrams, 1972).
- MEDIAN BARRIER.** A double-faced guard rail in the median or island dividing two adjacent roadways. (DePina, 1972)
- MESHING BOUNDARIES.** Characterized by continuing, homogeneous land uses or topography, expressed as: **LINES:** property lines, political or municipal divisions, main streets, etc.; **AREAS:** similar residential uses, compatible uses (as parks with residential). (U.S.D.P.)
- MICROCLIMATE.** The local climate of a given site or habitat varying in size from a tiny crevice to a large land area, but being usually characterized by considerable uniformity of climate. (Merriam-Webster, 1971)
- MODE OF TRAVEL.** Manner of moving from one place (the site) to another (other parts of the urban context). (U.S.D.P.)
- MODEL (OF URBAN LAYOUT).** A representation of an urban residential area illustrating circulation, land utilization, land subdivision, and utility network of a specific layout and lot. (U.S.D.P.)
- MUTUAL OWNERSHIP.** Private land ownership shared by two or more persons and their heir under mutual agreement. (U.S.D.P.)
- NATURAL FEATURES.** Prominent objects in or produced by nature. (U.S.D.P.)
- NATURAL UNDISTURBED SOIL.** Soils that have not been disturbed by artificial process. Although natural, they depend greatly on local conditions, environment, and past geological history of the formations. (U.S.D.P.)
- NEIGHBORHOOD.** A section lived in by neighbors and having distinguishing characteristics. (U.S.D.P.)
- NETWORK EFFICIENCY (LAYOUT EFFICIENCY).** The ratio of the length of the network to the area(s) contained within; or tangent to it. (U.S.D.P.)
- NEUTRAL WIRE.** Wire carrying no voltage between itself and a ground. (ROTC ST 45-7, 1953)
- NOISE.** Any sound (affecting the site) that is undesired (such as that produced by: traffic, airports, industry, etc.) (Merriam-Webster, 1971)
- ODOR.** A quality of something that affects the sense of smell. (Merriam-Webster, 1971)
- OHMS (electrical).** The unit of resistance to the flow electricity. The higher the number of ohms, the greater the resistance. When resistance is constant, amperage (and wattage) are in direct proportion to voltage. Resistance varies inversely with the cross-sectional area of the wire. Ohms = volts/amperes.  $R = E/I$ . The practical mks unit of electrical resistance that is equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere or to the resistance in which one watt of power is dissipated when one ampere flows through it and that is taken as standard in the U.S. (U.S.D.P.; ROTC ST 45-7, 1953; Merriam-Webster, 1971)
- OPTIMIZE/OPTIMIZE.** To bring to a peak of economic efficiency, specially by the use of precise analytical methods. (Merriam-Webster, 1971)
- ORGANIC SOILS.** Soils composed mostly of plant material. (U.S.D.P.)
- OXIDATION POND (LAGOON).** A method of sewage treatment using action of bacteria and algae to digest/decompose wastes. (U.S.D.P.)
- PERCENT RENT/MORTGAGE.** The fraction of income allocated for dwelling rental or dwelling mortgage payments; expressed as a percentage of total family income. (U.S.D.P.)
- PIT PRIVY/LATRINE.** A simple hole in the ground, usually hand dug, covered with slab and protective superstructure; for disposal of human excreta. (U.S.D.P.)
- PLANNING.** The establishment of goals, policies, and procedures for a social or economic unit, i.e. city. (U.S.D.P.)
- PLOT/LOT.** A measured parcel of land having fixed boundaries and access to public circulation. (U.S.D.P.)
- POLICE PROTECTION.** Police force: a body of trained men and women entrusted by a government with the maintenance of public peace and order, enforcement of laws, prevention and detection of crime. (Merriam-Webster, 1971)
- POPULATION DENSITY.** It is the ratio between the population of a given area and the area. It is expressed in people per hectare. It can be: **GROSS DENSITY:** includes any kind of land utilization, residential, circulation, public facilities, etc. **NET DENSITY:** includes only the residential land and does not include land for other uses. (U.S.D.P.)
- POSITION.** The point or area in space actually occupied by a physical object (the site). (Merriam-Webster, 1971)
- PRIMER.** A small introductory book on a specific subject. (U.S.D.P.)
- PRIVATE LAND OWNERSHIP.** The absolute tenure of land to a person and his heirs without restriction of time. (U.S.D.P.)
- PRIVY.** A small, often detached building having a bench with one or more round or oval holes through which the user may defecate or urinate (as into a pit or tub) and ordinarily lacking any means of automatic discharge of the matter deposited. (Merriam-Webster, 1971)
- PROJECT.** A plan undertaken; a specific plan or design. (U.S.D.P.)
- PUBLIC CIRCULATION.** The circulation network which is owned, controlled, and maintained by public agencies and is accessible to all members of a community. (U.S.D.P.)
- PUBLIC FACILITIES.** Facilities such as schools, playgrounds, parks, other facilities accessible to all members of a community which are owned, controlled, and maintained by public agencies. (U.S.D.P.)
- PUBLIC SERVICES AND COMMUNITY FACILITIES.** Includes: public transportation, police protection, fire protection, refuse collection, health, schools, and playgrounds, recreation and open spaces, other community facilities, business, commercial, small industries, markets. (U.S.D.P.)
- PUBLIC SYSTEM (general).** A system which is owned and operated by a local governmental authority or by an established public utility company which is controlled and regulated by a governmental authority. (HUD/AID, Minimum Standards, 1966)
- PUBLIC UTILITIES.** Includes: water supply, sanitary sewerage, storm drainage, electricity, street lighting, telephone, circulation networks. (U.S.D.P.)
- PUMP.** A device or machine that raises, transfers, or compresses fluids or that attenuates gases especially by suction or pressure or both. (Merriam-Webster, 1971)
- REFUSE COLLECTION.** The service for collection and disposal of all the solid wastes from a community. (U.S.D.P.)
- RESERVOIR.** Large-scale storage of water; also functions to control fluctuations in supply and pressure. (U.S.D.P.)
- RESIDENTIAL AREA.** An area containing the basic needs/requirements for daily life activities: housing, education, recreation, shopping, work. (U.S.D.P.)
- RESISTANCE.** The opposition to electrical flow. (Resistance increases as the length of wires is increased and decreases as the cross-sectional area of wires is increased). (ROTC ST 45-7, 1953)
- RIGHT-OF-WAY.** A legal right of passage over another person's ground (land), the area or way over which a right-of-way exists such as: a path or thorough-fare which one may lawfully use, the strip of land devoted to or over which is built a public road, the land

occupied by a railroad, the land used by a public utility. Rights-of-way may be shared (as streets, pedestrians and automobiles) or exclusive (as rapid transit routes; subways, railroads, etc.) (Merriam-Webster, 1971; U.S.D.P.)

**ROADWAY (HIGHWAY).** Portion of the highway included between the outside lines of gutter or side ditches, including all slopes, ditches, channels, and appurtenances necessary to proper drainage, protection, and use. (DePina, 1972)

**ROW/GROUPED HOUSING.** Dwelling units grouped together linearly or in clusters. (U.S.D.P.)

**RUNOFF.** That part of precipitation carried off from the area upon which it falls. (DePina, 1972)

**RUNOFF-RAINFALL RATIO.** The percentage (ratio) of stormwater runoff that is not reduced by evaporation, depression storage, surface wetting, and percolation; with increased rainfall duration, runoff-rainfall ratios rise increasing runoff flow. (U.S.D.P.)

**SAND.** Loose, distinguishable grains of quartz/feldspar, mica (ranging from 2mm to 0.02mm in diameter). (U.S.D.P.)

**SANITARY SEWERAGE.** The system of artificial usually subterranean conduits to carry off sewage composed of: *excreta:* waste matter eliminated from the human body; *domestic wastes:* used water from a home/community containing 0.1% total solids; and some industrial wastes, but not water from ground, surface, or storm. (U.S.D.P.)

**SEMI-DETACHED DWELLING.** Two dwelling units sharing a common wall (duplex). (U.S.D.P.)

**SEPTIC TANK.** A tank in which the organic solid matter of continuously flowing sewage is deposited and retained until it has been disintegrated by anaerobic bacteria. (Merriam-Webster, 1971)

**SERIES CIRCUIT.** Fixtures connected in a circuit by a single wire. When one fixture is out, the circuit is broken. Fixtures with different amperages cannot be used efficiently in the same circuit. (NOTC ST 45-7, 1953)

**SETTLEMENT.** Occupation by settlers to establish a residence or colony. (U.S.D.P.)

**SEWAGE.** The effluent in a sewer network. (U.S.D.P.)

**SEWER.** The conduit in a subterranean network used to carry off water and waste matter. (U.S.D.P.)

**SEWER BUILDING CONNECTION.** The pipe connecting the dwelling with the sewer network. (U.S.D.P.)

**SEWERAGE.** Sewerage system: the system of sewers in a city, town or locality. (Merriam-Webster, 1971)

**SHAPE.** Form/configuration of the site surface as defined by its perimeter/boundaries. (U.S.D.P.)

**SHOPPING.** (Facilities for) searching for, inspecting, or buying available goods or services. (U.S.D.P.)

**SILT.** Loose, unconsolidated sedimentary rock particles (ranging from 0.02mm to 0.002mm in diameter). (U.S.D.P.)

**SITE.** Land (that could be) made suitable for building purposes by dividing into lots, laying out streets and providing facilities. (Merriam-Webster, 1971)

**SITE AREAS.** Two types are considered: *GROSS AREA:* includes the whole site or the bounded piece of ground. *USABLE AREA:* includes only the portion of the site that can be fully utilized for buildings, streets, playgrounds, recreation facilities, gardens, or other structures. (U.S.D.P.)

**SITE AND SERVICES.** The subdivision of urban land and the provision of services for residential use and complementary commercial use. Site and services projects are aimed to improve the housing conditions for the low income groups of the population by providing: a) *TYPE:* the access to a piece of land where people can build their own dwellings; b) *SERVICES:* the opportunity of access to employment, utilities, services and community facilities, financing and communications. (U.S.D.P.)

**SIZE.** Physical magnitude or extent (of the site), relative or proportionate dimensions (of the site). (Merriam-Webster, 1971)

**SLOPE.** Degree or extent of deviation (of the land surface) from the horizontal. (Merriam-Webster, 1971)

**SMOKE.** The gaseous products of burning carbonaceous materials made visible by the presence of carbon particles. (Merriam-Webster, 1971)

**SOIL.** Soil structure: the arrangement of soil particles in various aggregates differing in shape, size, stability, and degree of adhesion to one another. (Merriam-Webster, 1971)

**SOIL INVESTIGATION.** It is the process to find the soil structure and other characteristics. It may include the following stages: initial soil survey, exploratory boring, construction boring. (U.S.D.P.)

**SOIL PIPE.** The pipe in a dwelling which carries the pipe discharge from water closets. (U.S.D.P.)

**SOIL SURVEY (INITIAL).** An on-site examination of surface soil conditions and reference to a GENERAL SOIL MAP. It is used to reveal obvious limitations/restrictions/hazards for early planning consideration. (U.S.D.P.)

**STACK.** The vertical pipe in a dwelling of the soil-, waste-, or vent-pipe systems. (NOTC ST 45-7, 1953)

**STANDARD.** 1) Something that is established by authority, custom or general consent as a model or example to be followed. 2) Something that is set up and established by authority as a rule for the measure of quantity, weight, extent, value or quality. (Merriam-Webster, 1971)

**STANDPIPE.** A pipe riser with tap used as a source of water for domestic purposes. (HUD/AID, Minimum Standards, 1966)

**STORM DRAINAGE.** Storm sewer: a sewer (system) designed to carry water wastes except sewage (exclusively storm water, surface runoff, or street wash). (Merriam-Webster, 1971)

**STREET LIGHTING.** Illumination to improve vision at night for security and for the extension of activities. (U.S.D.P.)

**SUBDIVISION REGULATIONS.** Regulations governing the development of raw land for residential or other purposes. (Abrams, 1972)

**SUBGRADE.** The layer of natural soil or fill (compacted soil) upon which the pavement structure including curbs is constructed. (DePina, 1972)

**SUBMAIN or BRANCH SEWER.** A collector pipe receiving sewage from lateral sewer only. (U.S.D.P.)

**SUBSISTENCE INCOME.** The minimum amount of money required for the purchase of food and fuel for an average family to survive. (U.S.D.P.)

**SULLAGE.** Drainage or refuse especially from a house, farmyard, or street. (Merriam-Webster, 1971)

**TAP (also FAUCET).** A fixture for drawing a liquid from a pipe, cask, or other vessel. (Merriam-Webster, 1971)

**TAX EXEMPTION.** A grant by a government of immunity from taxes; (a ten-year tax exemption on new housing in New York stimulated new construction in the 1920's; to ease its housing shortage, Turkey granted a ten-year tax exemption on new buildings). (Abrams, 1966)

**TAX INCENTIVE.** Favorable tax treatment to induce the beneficiary to do something he would not otherwise be likely to do. (U.S.D.P.)

**TAX STRUCTURE - TAXATION.** The method by which a nation (state, municipality) implements decisions to transfer resources from the private sector to the public sector. (U.S.D.P.)

**TELEPHONE.** An electrical voice communication network interconnecting all subscribing individuals and transmitting over wires. (U.S.D.P.)

**TENURE.** Two situations of tenure of the dwelling units and/or the lot/land are considered: *LEGAL:* having formal status derived from law; *EXTRALEGAL:* not regulated or sanctioned by law. Four types of tenure are considered: *RENTAL:* where the users pay a fee (daily, weekly, monthly) for the use of the dwelling unit and/or the lot/land; *LEASE:* where the users pay a fee for long-term use (generally for a year) for a dwelling unit and/or the lot/land from the owner (an individual, a public agency, or a private organization); *OWNERSHIP:* where the users hold in freehold the dwelling unit and/or the lot/land which the unit occupies; *EMPLOYER-PROVIDED:* where the users are provided a dwelling unit by an employer in exchange for services, i.e. domestic live-in servant. (U.S.D.P.)

**TITLE.** The instrument (as a deed) that constitutes a legally just cause of exclusive possession (of land, dwellings, or both). (Merriam-Webster, 1971)

**TOILET.** A fixture for defecation and urination, esp. water closet. (7th Collegiate Webster, 1963)

**TOPOGRAPHY.** The configuration of a (land) surface including its relief and the position of its natural and man-made features. (Merriam-Webster, 1971)

**TRANSPORTATION.** Means of conveyance or travel from one place (the site) to another (other parts of the urban context). (Merriam-Webster, 1971)

**TRAP.** A fitting that provides a water seal to prevent sewer gases and odors being discharged through fixtures. (NOTC ST 45-7, 1953)

**TREATMENT WORKS.** Filtration plant, reservoirs, and all other construction required for the treatment of a water supply. (NOTC ST 45-7, 1953)

**UNIT.** A determinate quantity adopted as a standard of measurement for other quantities of the same kind. (Merriam-Webster, 1971)

**URBAN TRANSPORTATION.** Means of conveyance of passengers or goods from one place to another along ways, routes of circulation in a metropolitan context. (U.S.D.P.)

**URBANIZATION.** The quality or state of being or becoming urbanized; to cause to take on urban characteristics. (U.S.D.P.)

**USE TAX.** The tax on land aimed primarily at enforcing its use or improvement. (U.S.D.P.)

**USER INCOME GROUPS.** Based upon the subsistence (minimum wage) income per year, five income groups are distinguished: *VERY LOW (below subsistence level):* the income group with no household income available for housing, services, or transportation; *LOW (1 x subsistence level):* the income group that can afford no or very limited subsidized housing; *MODERATE (3 x subsistence level):* the income group that can afford limited housing and rent only with government assistance; *HIGH (5 x subsistence level):* the income

group that can afford housing without subsidy, by cash purchase, through mortgage payments, or by rent; *VERY HIGH (10 x subsistence level):* the income group that represents the most economically mobile sector of the population. (U.S.D.P.)

**USUFRUCT.** The right to profit from a parcel of land or control of a parcel of land without becoming the owner or formal leasee; legal possession by decree without charge. (U.S.D.P.)

**UTILITIES.** Include: water supply, sanitary sewerage, storm drainage, electricity, street lighting, gas, telephone. (U.S.D.P.)

**UTILITY/SERVICE.** The organization and/or infrastructure for meeting the general need (as for water supply, wastewater removal, electricity, etc.) in the public interest. (U.S.D.P.)

**VALVE.** A water supply distribution component which interrupts the supply for maintenance purposes. (U.S.D.P.)

**VENT.** A pipe opening to the atmosphere, which provides ventilation for a drainage system and prevents trap siphonage or back pressure. (NOTC ST 45-7, 1953)

**VIBRATION.** A quivering or trembling motion (such as that produced by: heavy traffic, industry, aircraft, etc. (Merriam-Webster, 1971)

**VIEWS.** That which is revealed to the vision or can be seen (from the site). (Merriam-Webster, 1971)

**WALK-UP.** Dwelling units grouped in two to five stories with stairs for vertical circulation. (U.S.D.P.)

**WASTE PIPE.** A pipe (in a dwelling) which carries water from wash basins, sinks, and similar fixtures. (NOTC ST 45-7, 1953)

**WATER SUPPLY.** Source, means, or process of supplying water, (as for a community) usually involving reservoirs, pipelines, and often the watershed from which the water is ultimately drawn. (Merriam-Webster, 1971)

**WATERSHED.** The catchment area or drainage basin from which the waters of a stream or stream system are drawn. (Merriam-Webster, 1971)

**WATERWORKS.** The whole system of reservoirs, channels, mains, and pumping and purifying equipment by which a water supply is obtained and distributed to consumers. (Merriam-Webster, 1971)

**WATT.** Watts (w) measure the power of the flow of energy through a circuit. Wattage is the product of volts times amperes. Both watts and horsepower denote the rate of work being done. 746w = 1hp. (NOTC ST 45-7, 1953)

**ZONING ORDINANCE.** The demarcation of a city by ordinance into zones (areas/districts) and the establishment of regulations to govern the use of land and the location, bulk, height, shape, use, population density, and coverage of structures within each zone. (U.S.D.P.)

## BIBLIOGRAPHY

ANNUAL REVIEW OF GOVERNMENT ADMINISTRATION, Research Development and Evaluation Commission, Executive Yuan, Republic of China 1977

A STUDY OF MIXED LAND USE AND F.A.R. CONTROL IN TAIWAN, C.I.E.C.D., Republic of China July 1978

BACKGROUND NOTES: CHINA, REPUBLIC OF, Dept. of State Publication 7791, U.S. Government Printing Office, May 1976

BUILDING CODES AND URBAN PLANNING ORDINANCES, Dept. of Interior, Republic of China, Aug. 1977

THE GOOD LIFE, Living Environmental Preference of Low-Income People in Taichung City, environmental Research Center, Tunghai University, Taichung, Taiwan Republic of China Jan. 1975

GUILD FOR SURVEY-EVALUATION OF URBAN DWELLING ENVIRONMENT, J. Baldwin U.S.D.P. MIT, Cambridge, MA, USA 1974

HOUSING IN TAIWAN-APRELIMINARY STUDY, Astrid A. Monson, C.I.E.C.D. Taiwan Republic of China Oct. 1964

HOUSING PLANNING ORDINANCE, ministry of the interior, Taiwan Republic of China 1975

HOUSING THE URBAN POOR, Arthur P. Solomon, MIT Press Cambridge, MA 1974

MASTER PLAN OF TAICHUNG HARBOR SPECIAL DISTRICT, Bureau, Taiwan Provincial Construction Government, 1972

THE PLAN FOR MILTON KLYNES VOLUME ONE, The European printing company, London and Beletchley Bucking Hamshire England, March 1970

RENTAL MANU OF TAICHUNG CHIEN KOU MARKET HOUSING, 1967

THE STATISTICAL ABSTRACT OF TAICHUNG MUNICIPALITY, office of municipal government of Taichung, Taiwan, office of accounting and statistics, Taiwan Republic of China 1976

TAICHUNG HARBOR URBAN PLAN STUDY, Report on Present Land Use Survey, Li Hsiao Ling environmental research center Tunghai University, Taichung, Taiwan, Republic of China April 1976

THE TAICHUNG NEW HARBOR AREA, Present Land Use Survey II, Li Hsiao Ling, environmental Research center Tunghai University, Taichung, Taiwan Republic of China 1977

TAICHUNG REGION PRILIMINARY PLAN, C.I.E.C.D. Taiwan, March 1970

TAICHUNG, TAIWAN : STRUCTURE AND FUNCTION, Clifton W. Fannell, The department of geography, The University of Chicago, Chicago, Illinois, 1973

URBAN LIVING DENSITY STUDY, C.I.E.C.D. Taiwan Republic of China, April 1977

URBAN LAND REPLOTTING, Lin Yin Yen, Wen-Sun Book Co., Taipei, Taiwan Republic of China 1977

URBANIZATION PRIMER, Horacio Caminos, Reinhard Goethert, MIT Press, 1978

URBAN GROWTH AND THE PLANNING OF URBAN DEVELOPMENT, Urban Planning Department Economic Planning

URBAN GROWTH AND THE PLANNING OF URBAN DEVELOPMENT, IN TAIWAN, REPUBLIC OF CHINA, Housing And Urban Development Department Council For Economic Planning And Development, December 1977

URBAN AND REGIONAL DEVELOPMENT STATISTICS, Urban Planning Department Economic Planning Council Executive Yuan, 1976

WEBSTER'S NEW WORLD THESAURUS, Charlton Cairo, The New American Library, Inc., 1975

## EXPLANATORY NOTES

## QUALITY OF INFORMATION

The quality of information given in the drawings, charts, and descriptions have been qualified in the following manner:

Accurate: When taken from reliable or actual sources.

Approximate: When deducted from different and/or not completely reliable sources.

Tentative: When based upon rough estimations of limited sources.

## QUALITY OF SERVICES, FACILITIES AND UTILITIES

Adequate: When the existence of services, facilities and utilities are available in/to a locality.

Limited: When the existence of services, facilities and utilities are available to locality in a limited manner due to proximity.

None: When the existence of services, facilities and utilities are unavailable to a locality.

## METRIC SYSTEM EQUIVALENTS

Linear Measures

1 centimeter = 0.3937 inches

1 meter = 100 centimeters = 39.37 inches or 3.28 feet

1 kilometer = 1,000 meters = 3,280.83 feet or 0.62137 miles

1 inch = 2.54 centimeters

1 foot = 0.3048 meters

1 mile = 1.60935 kilometers

Square Measures

1 square meter = 1.550 square inches or 10.7639 square feet

1 hectare = 10,000 sq meters = 2.4711 acres

1 square foot = 0.0929 square meters

1 acre = 0.4087 hectares

## DOLLAR EQUIVALENTS

All income, cost and rent/mortgage data have been expressed in terms of the U.S. equivalent;

1 U.S. dollar = 36.05 N.T. dollars (1978)

(Existing Rate: Floating)